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NATIONAL DAM SAFETY PROGRAM. SMITTY'S CATFISH POND DAM (MO 3061--ETC(U)
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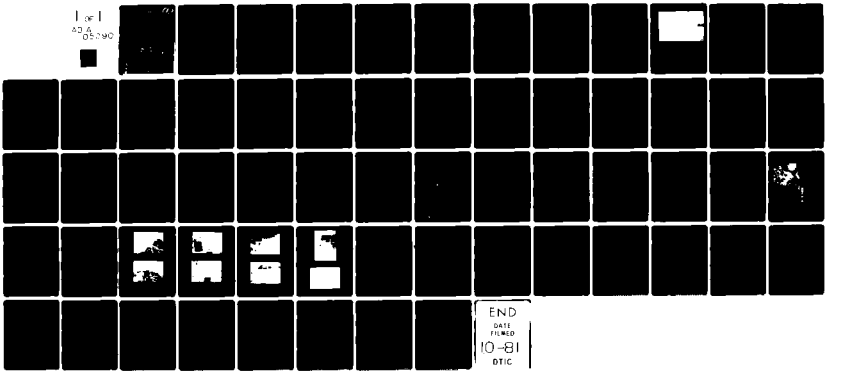

LEVEL II

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MISSISSIPPI-KASKASKIA-ST. LOUIS BASIN

SMITTY'S CATFISH POND DAM
MADISON COUNTY, MISSOURI
MO 30613

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION

United States Army
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St. Louis District

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

SUBJECT: Smitty's Catfish Pond Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Smitty's Catfish Pond Dam (MO 30613).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

a. Spillway will not pass 50 percent of the Probable Maximum Flood without overtopping the dam.

b. Overtopping of the dam could result in failure of the dam.

c. Dam failure significantly increases the hazard to loss of life downstream.

A major concern is the steep downstream slope. Immediate remedial measures should be undertaken to ensure embankment stability.

SUBMITTED BY: SIGNED — 9 JUL 1981
Chief, Engineering Division — Date

APPROVED BY: SIGNED — 10 JUL 1981
Colonel, CE, Commanding — Date

SMITTY'S CATFISH POND DAM

Madison County, Missouri

Missouri Inventory No. 30613

Phase I Inspection Report

National Dam Safety Program

Prepared by

Woodward-Clyde Consultants

Chicago, Illinois

Under Direction of

St Louis District, Corps of Engineers

for

Governor of Missouri

April 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I investigation is not to provide a complete evaluation of the safety of the structure nor to provide a guarantee on its future integrity. Rather the purpose of the program is to identify potentially hazardous conditions to the extent they can be identified by a visual examination. The assessment of the general condition of the dam is based upon available data (if any) and visual inspections. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for more detailed studies. In view of the limited nature of the Phase I studies no assurance can be given that all deficiencies have been identified.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with any data which may be available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action removes the normal load on the structure, as well as the reservoir head along with seepage pressures, and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, so that corrective action can be taken. Likewise continued care and maintenance are necessary to minimize the possibility of development of unsafe conditions.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam	Smitty's Catfish Pond Dam
State Located	Missouri
County Located	Madison
Stream	Greasy Creek
Date of Inspection	25 February 1981

Smitty's Catfish Pond Dam, Missouri Inventory Number 30613, was inspected by Richard Berggreen (engineering geologist), Pierre Mallard (geotechnical engineer), Jean-Yves Perez (geotechnical engineer), and Sean Tseng (hydrologist). The dam is an earth dam constructed to impound a lake for recreational use.

The dam inspection was made following the guidelines presented in the "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed by the Chief of Engineers, US Army, Washington, DC, with the help of federal and state agencies, professional engineering organizations, and private engineers. The resulting guidelines represent a consensus of the engineering profession. These guidelines are intended to provide for an expeditious identification of those dams which may pose hazards to human life or property, based on available data and a visual inspection. In view of the limited scope of the study, no assurance can be given that all deficiencies have been identified.

Smitty's Catfish Pond Dam is in the small size classification based on its maximum height of 26.6 ft and on its reservoir storage capacity of approximately 68 ac-ft. The small dam classification includes dams between 25 and 40 ft in height, or having storage capacity between 50 and 1000 ac-ft.

The St Louis District (SLD), Corps of Engineers, has classified this dam as having a high hazard potential; we concur with this classification. The hazard zone length estimated by the SLD extends approximately two miles downstream of the dam. Within the first half mile are a barn, an occupied residence, and Pogue Lake Dam and reservoir (MO 30127). Several other occupied dwellings are present further downstream in the estimated damage zone. Contents of the damage zone were verified on the ground and with aerial reconnaissance.

It was reported by the original dam owner that the spillway portion of the dam washed out prior to construction of the concrete spillway. No reports of significant damage were obtained regarding this event. Based on this history of failure, and the relatively small height (26.6 ft) and small impounded storage (68 ac-ft), a spillway design flood of 50 percent of PMF is recommended.

Based on the steepness of the downstream slope and relatively erodible embankment materials it should be noted that given the present condition of the dam, overtopping by flood events greater than the spillway design flood could cause sufficient erosion to develop a breach of this dam.

The results of the visual inspection indicate the dam is in generally poor condition. A small slump with a volume of 2 to 3 yd^3 was noted on the downstream slope of the dam. This appeared to be a recent feature. The downstream slope is quite steep, generally 1.8(H) to 1(V), but is locally steeper than 1(H) to 1(V), and is judged to be only marginally stable. Animal burrows, to 8-in. in diameter, were noted at several locations on the downstream slope. Trees growing on the embankment could provide piping paths through the dam. Seepage and stability analyses comparable to the requirements of the guidelines were not available, which is considered a deficiency. Hydraulic and hydrologic analyses indicate the dam will be overtopped by a flood greater than 23 percent of the Probable Maximum Flood (PMF). The PMF is defined as the flood event that may be expected to occur from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. These analyses also indicate that the dam will not be overtopped by the 1 percent probability-of-occurrence flood (100 year recurrence flood). The 1 percent probability-of-occurrence flood is the flood that has 1 percent probability of occurring in any one year, or occurs on the average of once every 100 years.

No evidence was noted of disruption of the vertical or horizontal alignment of the dam crest, sinkhole development, or erosion at the junction of the embankment and abutments.

Based on our evaluation of the information obtained from the visual inspection and analysis of other available data, the following recommendations should be addressed immediately.

1. Perform seepage and stability analyses of the present configuration of the dam in accordance with the "Recommended Guidelines for Safety Inspection of Dams." The findings of these analyses should be immediately incorporated into remedial measures to improve the apparently marginally stable downstream slope.

2. Prepare and institute an animal control program to prevent animal burrowing in the embankment. This program should include repair of existing animal burrows.

3. Prepare a detailed hydraulic and hydrologic analysis and design a spillway and discharge channel system capable of passing the recommended spillway design flood (50 percent of the PMF) without overtopping the dam. The design of modifications to the spillway and discharge channel should include measures to prevent erosion.

4. Trees growing on an earth dam can have an adverse impact on the dam safety. Cutting trees down and leaving the stumps and roots to decay may worsen the conditions. Removal of trees should be done under the guidance of an engineer experienced in design, construction and maintenance of earth dams. Indiscriminate removal of trees could jeopardize the safety of the dam.

5. In lieu of these recommendations, the dam should be breached in a controlled manner to remove the threat to the downstream residents.

It is recommended that a program of periodic inspection and maintenance be developed and implemented without undue delay. This program should include as a minimum the following items.

1. Inspect areas of seepage to identify changes in conditions, such as increased volume of flow or turbidity (soil) in the seepage water.

2. Monitor the embankment and dam crest for evidence of slope instability, such as cracking or slumping of the embankment, or settlement of the crest.

3. Maintain the spillway and fish control fence free of debris that could obstruct the spillway during flood flows.

4. Evaluate the feasibility of a practical warning system to alert downstream residents in the event unsafe conditions develop at this facility.

All remedial measures, inspections and maintenance should be performed by or under the guidance of an engineer experienced in the design, construction and maintenance of earth dams.

WOODWARD-CLYDE CONSULTANTS

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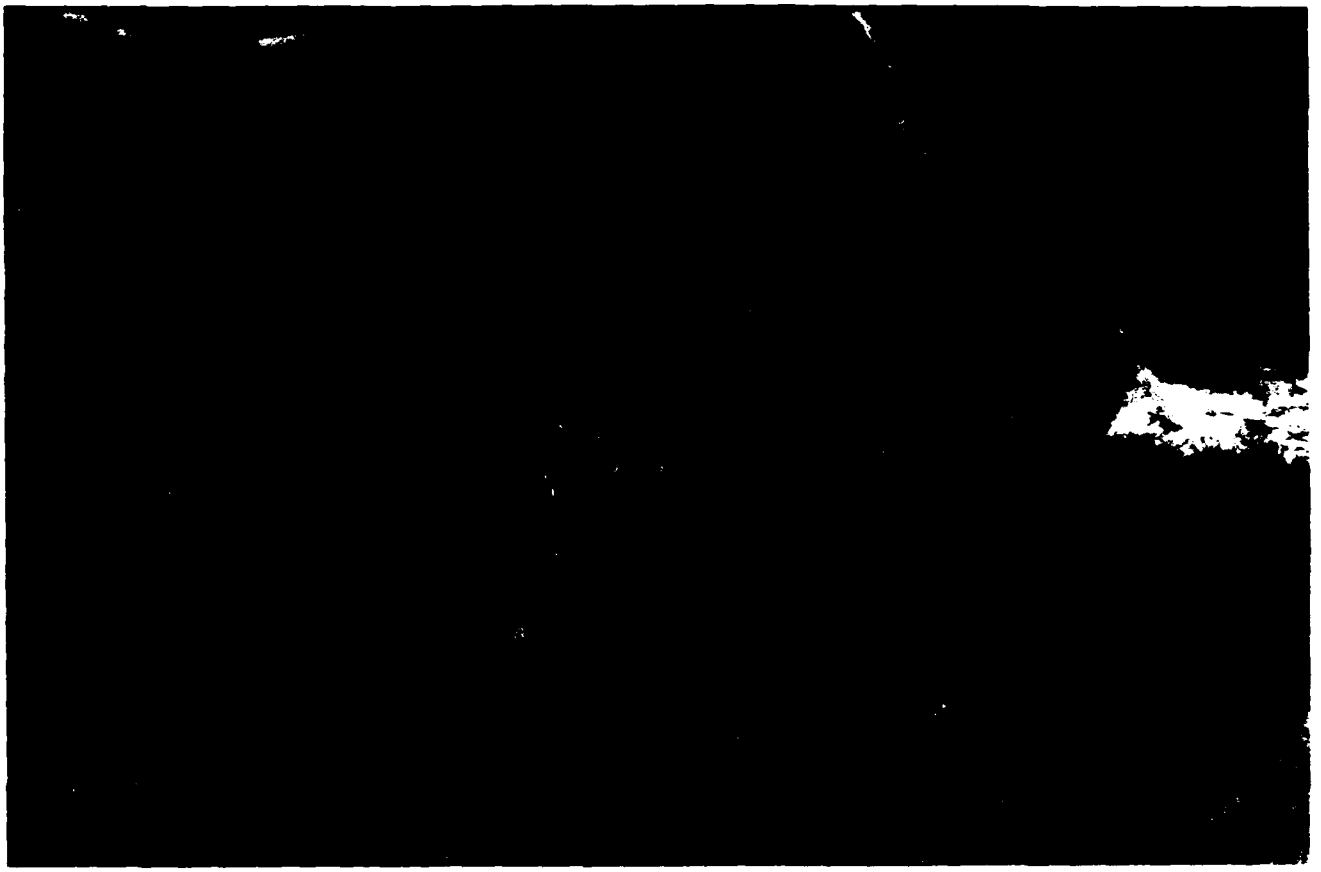

OVERVIEW

SMITTY'S CATFISH POND DAM

MISSOURI INVENTORY NUMBER 30613

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SMITTY'S CATFISH POND DAM - MISSOURI INVENTORY NO. 30613
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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SMITTY'S CATFISH POND DAM, MISSOURI INVENTORY NO. 30613

SECTION 1
PROJECT INFORMATION

1.1 General

a. **Authority.** The National Dam Inspection Act, Public Law 92-367, provides for a national inventory and inspection of dams throughout the United States. Pursuant to the above, an inspection was conducted of Smitty's Catfish Pond Dam, Missouri Inventory Number 30613.

b. **Purpose of investigation.** "The primary purpose of the Phase I investigation program is to identify expeditiously those dams which may pose hazards to human life or property... The Phase I investigation will develop an assessment of the general condition with respect to safety of the project based upon available data and a visual inspection, determine any need for emergency measures and conclude if additional studies, investigations and analyses are necessary and warranted" (Chapter 3, "Recommended Guidelines for Safety Inspection of Dams").

c. **Evaluation criteria.** The criteria used to evaluate the dam were established in the "Recommended Guidelines for Safety Inspection of Dams," and Engineering Regulation No. 1110-2-106 and Engineering Circular No. 1110-2-188, "Engineering and Design National Program for Inspection of Non-Federal Dams," prepared by the Office of Chief of Engineers, Department of Army; and "Hydrologic/Hydraulic Standards, Phase I Safety Inspection of Non-Federal Dams," prepared by the St Louis District (SLD), Corps of Engineers. These guidelines were developed with the help of several federal agencies and many state agencies, professional engineering organizations, and private engineers.

1.2 Description of Project

a. **Description of dam and appurtenances.** Smitty's Catfish Pond Dam is an earth dam impounding a lake used for recreational purposes. The embankment is constructed of locally-obtained, rocky, silty and clayey soil. The downstream slope is quite steep, typically 1.8(H) to 1(V), but locally steeper than 1(H) to 1(V) (in the vicinity of the maximum section). The downstream slope is vegetated with weeds, brush, and trees to approximately 8-in. diameter, and is judged moderately to highly susceptible to erosion in the event of overtopping.

The spillway is a vertical concrete wall near the maximum section. Flow through the spillway at the time of the visual inspection was estimated at 1 to 2 ft^3/sec. The downstream channel flows out of a small stilling pool at the toe of the spillway directly into the natural streambed for Greasy Creek. No control structures are present at this spillway.

b **Location.** The dam is located on Greasy Creek, about 1/2 mi south of Missouri State Highway A, and 5 mi northwest of the town of Marquand in Madison County, Missouri (Fig. 1). The dam is in Section 11, T32N, R7E, on the USGS Marquand, Missouri 7.5-minute quadrangle map (1980).

c. **Size classification.** The dam is classified small size based on its height of approximately 27 ft and storage capacity of 68 ac-ft. The small dam classification criteria are: height between 25 and 40 ft, or storage capacity between 50 and 1000 ac-ft.

d. **Hazard classification.** The St Louis District (SLD), Corps of Engineers, has classified this dam as having a high hazard potential; we concur with this classification. The SLD estimated damage zone length extends approximately two miles downstream of the dam. Pogue Lake and Dam (MO 30127) and several residences and barns are located in the damage zone. The contents of the damage zone were verified on the ground and during aerial reconnaissance.

e. **Ownership.** The dam is reportedly owned by Mr Charles Statzel, No. 3 Carman Acres, Manchester, Missouri 63011.

f. **Purpose of dam.** The dam was constructed to impound a reservoir for recreational use.

g. **Design and construction history.** No design plans were available for the dam. Mr Bert Brown of Farmington, Missouri was the original owner and builder of the dam. He reported the dam was built without engineering or design plans. The dam was built from 1960-1961. The concrete spillway was added in about 1965 after several washouts of the earth embankment spillway.

A local resident, Mr Ridgely Reichardt, reported to the inspection team that the dam failed in the early 1970's. However, when asked, Mr Brown said it had not failed since the concrete spillway was added in 1965. This disagreement could not be resolved.

h. **Normal operating procedures.** No operating records or procedures were found for this dam. Flood flows pass over the uncontrolled spillway near the left abutment.

1.3 Pertinent Data

a. **Drainage area.** 0.95 mi^2

b. **Discharge at dam site.**

Maximum known flood at damsite	Dam reported by Mr Ridgely Reichardt, a local resident, to have been overtopped and breached in early 1970's. (This report could not be verified).
Warm water outlet at pool elevation	N/A (not applicable)
Diversion tunnel low pool outlet at pool elevation	N/A
Diversion tunnel outlet at pool elevation	N/A
Gated spillway capacity at pool elevation	N/A
Gated spillway capacity at maximum pool elevation	N/A
Ungated spillway capacity at maximum pool elevation	890 ft^3/sec
Total spillway capacity at maximum pool elevation	890 ft^3/sec

c. **Elevations (ft above MSL).**

Top of dam	818.4 to 820.0
Maximum pool - design surcharge	N/A
Full flood control pool	N/A
Recreation pool (spillway crest-ungated)	815.8
Spillway crest (gated)	N/A
Upstream portal invert diversion tunnel	N/A
Downstream portal invert diversion tunnel	N/A
Streambed at centerline of dam	Unknown
Maximum tailwater	795.5 (at time of visual inspection)
Toe of dam at maximum section	792.7

d. **Reservoir.**

Length of maximum pool	1400 ft
Length of recreation pool	1300 ft
Length of flood control pool	N/A

e. **Storage (acre-feet).**

Recreation pool	39
Flood control pool	N/A
Design surcharge	N/A
Top of dam	68

f. **Reservoir surface (acres).**

Top of dam	14
Maximum pool	14
Flood control pool	N/A
Recreation pool	10
Spillway crest	10

g. **Dam.**

Type	Earth
Length	290 ft
Height	26.6 ft
Top width	12 to 14 ft
Side slopes	Downstream typically 1.8(H) to 1(V), locally steeper than 1(H) to 1(V) Upstream unknown.
Zoning	Unknown, probably none.
Impervious core	Unknown.
Cutoff	Unknown, probably excavated to shallow bedrock.
Grout curtain	Unknown, probably none.

h. **Diversion and regulating tunnel.**

Type	None
Length	N/A
Closure	N/A
Access	N/A
Regulating facilities	N/A

i. **Spillway.**

Type	Uncontrolled vertical concrete wall near left end of dam. Two buttress support walls on downstream side. Small stilling basin at base of spillway wall. Fish control fence and metal posts along crest could create obstructions to flow.
Length of weir	Approximately 62 ft
Crest elevation	815.8 ft
Gates	None
Downstream channel	Natural stream channel, eroded to bedrock. Minimal erosion potential.

j. **Regulating outlets.** None.

SECTION 2
ENGINEERING DATA

2.1 Design

No design drawings or reports were available for this dam. Mr Bert Brown, the original owner and builder of the dam, reported the dam was built without an engineering report or design plans.

2.2 Construction

There were no construction reports available for this dam. Mr Brown, the builder of the dam, could not supply any information on construction other than that the embankment was constructed in 1960-1961 of locally obtained soil. The concrete spillway was added in 1965 after several washouts of the earthen spillway.

2.3 Operation

There are no facilities requiring operation at this dam.

2.4 Evaluation

a. **Availability.** The only information available on design or construction of the dam was through phone interviews with the builder and former owner of the dam, Mr Bert Brown.

b. **Adequacy.** The available engineering, design, and construction data are insufficient to evaluate the design of this dam. Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" are not on record, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions, including earthquake loads, and made a matter of record. The analyses should be performed by an engineer experienced in the design and construction of earth dams.

c. **Validity.** There appeared to be no reason to question the validity of the information obtained from Mr Brown. It was in general agreement with the observations made during the visual inspection. However, the information was incomplete.

2.5 Project Geology

The dam is located on the southeast flank of the Ozark structural dome. The regional dip is toward the southeast, but local variations occur in the vicinity of exposed and buried Precambrian bedrock knobs. The bedrock in the area is mapped as Precambrian age St Francois Mountains Volcanic Supergroup (Fig. 4), consisting of rhyolite and felsite volcanic rock. This material is exposed in the left abutment, discharge channel, and at the toe of the maximum section. Cambrian age sedimentary rocks of the Elvins Group and Bonneterre Formation are also mapped in the area (Fig. 4), but were not found outcropping at the dam site.

The soil at the damsite consists of gravelly to sandy silty clay (CL) and clayey silt (ML). The material was sampled and classified in the field. This was the soil used in the dam construction. The erosion potential of the embankment materials was judged moderate to high in the event of overtopping of the embankment. The soil is mapped on the General Soils Map of Missouri (1979) as Peridge-Cantwell-Gasconade Soil Association.

Several faults are mapped in the vicinity of the dam site. The Greenville Fault, located about 8 mi south of the dam, is a northeast-southwest trending fault approximately 38 miles long. The fault is mapped as northwest side up.

A branch of the Simms Mountain Fault System is mapped approximately 9 mi northeast of the dam. This system is a complex branching series of faults about 40 mi in length, trending northwest-southeast. Displacement on the fault system is generally southwest side up.

These faults, like most others in the Ozark region, occur in Precambrian and Paleozoic bedrock and are likely Paleozoic in age. The area is not seismically active and these faults are not considered to pose an unusual hazard to the dam.

The dam is located approximately 70 mi northwest of the line of epicenters for the very large New Madrid earthquakes of 1811 and 1812. A recurrence of an earthquake of the magnitude of the New Madrid events could cause damage to the dam, but an evaluation of this risk is beyond the scope of this Phase I investigation.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. **General.** A visual inspection was made of Smitty's Catfish Pond Dam on 25 February 1981. Mr Charles Statzel, the owner of the dam, met with the inspection team at the dam. The inspection indicated the dam is in generally poor condition.

b. **Dam.** The dam is an earth embankment constructed of locally obtained weathered bedrock and residual soil. The embankment materials consist of gravelly silty clay (CL) and clayey silt (ML).

The downsteam slope is steep (Fig. 3B), typically 1.8(H) to 1(V), but locally the slopes are steeper than 1(H) to 1(V). As a result of the steep slopes and the embankment materials, the dam is judged to be moderately to highly erodible in the event of overtopping.

A slump was noted on the downstream slope of the embankment, in the vicinity of Sta 2+00 on Fig. 3A, possibly as a result of the steep slope. The slump was recent, evidenced by a distinct scarp and lobate toe. The volume of the slump was estimated at 2 to 3 yd^3.

The downstream slope is vegetated with weeds, brush and moderate size trees to 8-in. diameter (Photo 1). These trees could pose a hazard to the dam if they are cut down or die, and decaying roots provide potential piping paths. These trees could also damage the embankment if they were blown down.

No erosion protection or riprap was noted on the upstream slope of the dam. Some wave erosion has occurred at the water line, but at present does not appear to pose a hazard to the dam. The dam crest is approximately 12 to 14 ft wide (Photo 2).

Several large animal burrows (Photo 3), approximately 8-in. in diameter and at least several feet in depth, were noted on the downstream slope of the dam near the spillway and near the center of the dam, at approximately Sta 1+25. These burrows could provide a sufficiently large piping path to result in failure of the dam.

Seepage was noted at the base of the dam, near the maximum section (Photo 4). The seepage rate was estimated at 1 to 2 gal/min. The area was stained with red-brown algae, but the water did not appear to be transporting any soil. The seepage may have been occurring at the contact of the embankment and the bedrock or through the bedrock.

Outcroppings of hard, unweathered felsite on the left abutment, in the discharge channel, and at the toe of the maximum-section indicate the dam is founded on bedrock (Photo 5). Little or no soil cover was present at the immediate damsite.

The crest of the dam is generally flat and supports a cover of grass. The crest is slightly lower adjacent to the spillway. Gravel piles have been added adjacent to both sides of the spillway (see Fig. 3A, and Photo 6).

No signs of cracking or sinkholes were noted. No erosion was noted at the junction of the embankment and right abutment. The left abutment, adjacent to the spillway, consists of exposed felsite bedrock. The upper portion of this slope has been covered with concrete to prevent erosion in the event overtopping occurs in this area.

c. **Appurtenant structures.** The spillway near the left abutment is the only appurtenant structure identified at this dam. The spillway consists of a vertical concrete wall approximately 15 ft high (Photo 5). Buttress walls have been built near the center of the spillway and at the junction of the spillway with the main dam (Photos 5 and 7). A small settling basin is at the immediate toe of the spillway. At the time of the visual inspection, water was flowing over the left half of the spillway about 1 to 2 in. deep. The flow was estimated at 1 to 2 ft^3/sec.

Metal fence posts are embedded in the crest of the spillway but were serving no apparent purpose. A fish control fence (Photo 6) had been constructed immediately upstream from the spillway. This fence could collect debris and obstruct flow in the event of flooding.

d. **Reservoir.** The slopes surrounding the reservoir are relatively flat, on the order of 5(H) to 1(V) or flatter. The area is mostly forested and has little potential for erosion or siltation. No records were available of siltation at this reservoir. The present owner reported numerous springs, at least seven, were observed in the area of the reservoir prior to impounding of the lake. No housing development, logging or agriculture was reported for the drainage basin.

e. **Downstream channel.** The downstream channel is eroded to bedrock and is not likely to be subject to significant erosion. The channel occupies the natural drainage channel for Greasy Creek. Pogue Lake and Dam (MO 30127), a horse stable and residence are located within approximately 1/2 mi downstream.

3.2 Evaluation

The results of the visual inspection indicate the dam is in generally poor condition.

A recent slump was identified on the downstream slope of the embankment. Animal burrows were noted at several locations on the embankment. The downstream slope appears quite steep and is judged moderately to highly susceptible to erosion in the event of overtopping. No riprap or other erosion protection was noted on the upstream slope of the dam. Trees to 8-in. diameter were noted on the dam. The condition of the dam and specific deficiencies were discussed with the owner following the inspection. It was recommended that remedial work, such as removal of trees, should be done under the guidance of an engineer experienced in design, construction, and maintenance of dams. Indescriminate removal of large trees could jeopardize the safety of the dam. However, we were informed by Mrs Reichardt that following the visual inspection, some trees were cut from the downstream slope of the dam.

The seepage noted at the toe of the dam did not appear to be transporting any soil. The seepage rate was estimated at 1 to 2 gal/min. No cracking or sinkhole development was noted on the embankment. No significant erosion was noted at the junction of the embankment and abutments.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No facilities requiring operation were identified at this dam. Water level in the reservoir is controlled by flow over the ungated concrete spillway weir. No other outlet facilities are present at this dam.

4.2 Maintenance of Dam

No records of maintenance were identified for this dam. The only identifiable maintenance performed on this dam was the cutting of grass on the dam crest. It was reported to the inspection team by Mrs Reichardt that following our inspection, trees were cut on the downstream slope of the dam.

4.3 Maintenance of Operating Facilities

No facilities requiring operation exist at this dam.

4.4 Description of Any Warning System in Effect

No warning system was identified during the visual inspection of this dam.

4.5 Evaluation

There is apparently no formal maintenance program in effect for this dam. As there are several structures and Pogue Lake dam and reservoir within 1/2 mi downstream of the dam, it is recommended that a formal maintenance program be developed for this dam. It is also recommended that the feasibility of a practical and effective warning system be evaluated to alert downstream residents in the event hazardous conditions develop at this dam.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. **Design data.** No hydraulic or hydrologic data were available for evaluation of the dam or reservoir. Dimensions of the dam and spillway were surveyed by James F. McCaul, III and Associates, Potosi, Missouri. Other relevant data were measured during the visual inspection or from topographic mapping. The maps used in the analyses were the USGS Marquand (1980) and Cherokee Pass (1980) 7.5-minute quadrangle maps.

b. **Experience data.** No recorded rainfall, runoff, discharge, or pool stage historical data were found for this reservoir.

It was reported by a local resident, Mr Ridgely Reichardt, that the dam had breached in the early 1970's. Mr Bert Brown, the former owner of the dam, was interviewed with regards to this and he indicated this was not true. He did report that the spillway had washed out several times shortly after the dam was constructed in 1961, but following construction of the concrete spillway in 1965, no further problems had developed. This disagreement could not be resolved by the inspection team.

c. **Visual observation.**

1. Watershed. The watershed is mostly natural woodland. No timber or agricultural development was reported for the drainage basin. The area of the reservoir is approximately 2 percent of the total drainage area of 0.95 mi^2.

2. Reservoir. The reservoir and dam are best described by the maps and photographs enclosed herewith. The primary purpose of this impoundment is for recreational use.

3. Spillway. The spillway for this dam is a concrete weir at the left (east) end of the embankment, adjacent to the natural hillside. There are no gates or other control facilities at this spillway. There is a shallow stilling basin at the toe of the spillway which discharges directly into the natural stream channel downstream of the dam.

d. **Overtopping potential.** One of the primary considerations in the evaluation of this dam is the assessment of the potential for overtopping and consequent failure by erosion of the embankment. Because the spillway of the dam is concrete, erosion at the spillway due to high velocity discharge is not expected to be a major consideration. The junction of the spillway and left abutment is also concrete covered and consists of outcropping bedrock. This area is also considered not to be subject to significant erosion. The lowest portion of the crest of the dam, near the center of the embankment (Fig. 3A), was considered the minimum top of dam for the overtopping analysis.

Hydrologic analyses of this dam for the 1 and 10 percent probability-of-occurrence (100 year and 10 year recurrence floods) and Probable Maximum Flood (PMF) events were all based on initial water surface elevations equal to the lowest spillway crest elevation. The PMF is defined as the flood event that may be expected to occur from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The results of the analyses indicate that a flood of greater than 23 percent of the PMF will overtop the dam. The analyses also indicate that the spillway will pass the 1 percent probability-of-occurrence flood without overtopping the dam. The 1 percent probability-of-occurrence flood is the precipitation event that has a 1 percent chance of occurring in any one year, or occurs on the average of once every 100 years. The spillway capacity at maximum pool elevation (minimum top of dam) is approximately 890 ft^3/sec.

The following table presents the results of the overtopping analysis for various precipitation events.

Precipitation Event	Maximum Reservoir Elevation, ft (MSL)	Maximum Depth Over Dam, ft	Maximum Outflow, ft^3/sec	Duration of Overtopping, hrs
1% Prob	818.2	0.0	800	0.0
23% PMF	818.4	0.0	890	0.0
50% PMF	819.4	1.0	1970	4.25
100% PMF	820.4	2.0	3950	6.5

It should be noted that for significant flooding events, such as 50 and 100 percent of the PMF, overtopping of the dam is calculated to be of sufficient depth and duration as to result in erosion of the embankment. Flow velocity at 100 percent of the PMF is estimated at approximately 7 ft/sec. It is judged that this would be sufficient to result in development of an effective breach of the embankment.

Based on reports of dam failure in the post and no record of significant impact downstream, and the relatively small height (26.6 ft) and small storage capacity (68 ac-ft), 50 percent of the PMF is the recommended spillway design flood. The steepness of the present downstream slope and erodible embankment materials indicate that overtopping by flood events larger than the spillway design flood could cause sufficient erosion to develop a breach of this dam.

Input data and output summaries for the hydraulic and hydrologic analyses are presented in the attached Appendix B.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. **Visual inspection.** The visual inspection identified a number of deficiencies that could affect the structural stability of the embankment.

The downstream slope of the dam is steep, typically 1.8(H) to 1(V), with portions that are steeper than 1(H) to 1(V). A recent slump was noted on the downstream slope, with a distinct head scarp and lobate toe. These conditions indicate the slope is only marginally stable in its present configuration.

The downstream slope was vegetated with weeds, brush, and moderate size trees at the time of the visual inspection. The owner was informed that trees are considered a deficiency on an earth dam. It was recommended that a plan to remove these trees be prepared by an engineer experienced in earth dams, and that indiscriminate removal of trees could jeopardize the safety of the dam. It was reported to us by Mrs Reichardt that after the inspection, some trees were cut from the downstream face.

Several large animal burrows, approximately 8-in. in diameter, were noted on the downstream slope of the dam. These burrows could provide a sufficiently large piping path to result in failure of the dam.

b. **Design and construction data.** No design or construction data were available for this dam. It was reported by the builder and former owner of the dam, Mr Bert Brown, that no engineering or design plans were used in the construction of this dam.

Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. **Operating records.** There are no facilities requiring operation at this dam. No water level or outflow records were found for this dam.

It was reported by a local resident, Mr Ridgely Reichardt, that the dam had breached in the early 1970's. Mr Brown, the former owner of the dam, was interviewed with regards to this and he indicated this was not true. He did report that the spillway had washed out several times shortly after the dam was constructed, but following construction of the concrete spillway in 1965, no further problems developed.

This disagreement could not be resolved by the inspection team.

d. **Post construction changes.** The construction of the concrete spillway in 1965 was the only post construction change reported to the inspection team. It appeared that a concrete-block buttress wall had recently been added to the right side of the spillway adjacent to the dam embankment. However, no record was available for when this was built.

The growth of trees on the dam was the only other post construction change noted at this dam.

e. **Seismic stability.** The dam is located in Seismic Zone 2 to which the guidelines assign a moderate damage potential. During a seismic event, liquefaction of the gravelly, silt and clay embankment material is unlikely. However, without knowledge of the soil properties of the embankment materials and in view of the steep slope on the downstream face of the dam, the seismic stability of the dam cannot be evaluated.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

a. **Safety.** Based on the visual inspection, the dam embankment and appurtenant facilities are judged to be in generally poor condition.

A slump was noted on the downstream slope of the embankment. The downstream slope is generally quite steep, on the order of 1.8(H) to 1(V), and locally steeper than 1(H) to 1(V). Animal burrows, to 8-in. diameter, were noted at several locations on the downstream slope. Trees growing on the embankment could provide piping paths through the embankment. Seepage could provide piping paths through the embankment. Seepage and stability analyses comparable to the requirements of the guidelines were not available, which is considered a deficiency. The hydraulic/hydrologic analyses indicate the dam will be overtopped by a flood greater than 23 percent of the Probable Maximum Flood (PMF), which is considered a deficiency. Based on reports of dam failure in the past and no record of significant impact downstream, and the relatively small height (26.6 ft) and small storage capacity (68 ac-ft), 50 percent of the PMF is the recommended spillway design flood. The steepness of the present downstream slope and erodible embankment materials indicate overtopping by flood events larger than the spillway design flood could cause sufficient erosion to develop a breach of the dam.

b. **Adequacy of information.** The visual inspection provided sufficient information to support the recommendations presented in this Phase I report. Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" were not available; this is considered a deficiency which should be rectified.

c. **Urgency.** The deficiencies described in this report could affect the safety of the dam. The recommendations in Section 7.2b concerning the remedial measures on the embankment and spillway capacity should be acted on immediately. Other recommendations presented in Section 7.2c should be acted on without undue delay.

d. **Necessity for Phase II.** In accordance with the "Recommended Guidelines for Safety Inspection of Dams," the subject investigation was a minimum study. This study revealed that additional in-depth investigations are needed to complete the assessment of the safety of the dam. Those investigations which should be performed immediately are described in Section 7.2b. It is our understanding from discussions with the SLD that any additional investigations are the responsibility of the owner.

7.2 Remedial Measures

a. **Alternatives.** There are several general options which may be considered to reduce the possibility of dam failure or to diminish the harmful consequences of such a failure. Some of these options are listed below.

1. Remove the dam, or breach it to prevent storage of water.

2. Increase the height of dam and/or spillway size to pass the spillway design flood (50 percent of the PMF) without overtopping the dam.

3. Purchase downstream land that would be adversely impacted by dam failure, and restrict human occupancy.

4. Provide a highly reliable flood warning system (generally does not prevent damage but diminishes chances for loss of life).

b. **Recommendations.** Based on our visual inspection it is recommended that the following topics be addressed immediately.

1. Perform seepage and stability analyses of the present configuration of the dam in accordance with the "Recommended Guidelines for Safety Inspection of Dams." The findings of these analyses should be immediately incorporated into remedial measures to improve the apparently marginally stable downstream slope.

2. Prepare and institute an animal control program to prevent animal burrowing in the embankment. This program should include repair of existing animal burrows.

3. Prepare a detailed hydraulic and hydrologic analysis and design a spillway and discharge channel system capable of passing the spillway design flood (50 percent of the PMF) without overtopping the dam. The design of modifications to the spillway and discharge channel should include measures to prevent erosion.

4. Trees growing on an earth dam can have an adverse impact on the dam safety. Cutting trees down and leaving the stumps and roots to decay may worsen the condition. Removal of trees should be done under the guidance of an engineer experienced in design, construction and maintenance of earth dams. Indiscriminate removal of trees could jeopardize the safety of the dam.

5. If it is not considered economical to implement these modifications, we recommend that the dam be breached in a controlled manner to remove the threat to the downstream residents.

c. O & M procedures. It is recommended that a program of periodic inspections and maintenance be developed and implemented without undue delay. This program should include, as a minimum, the following measures.

1. Inspect areas of seepage to identify changes in conditions, such as increased volume of flow or turbidity (soil) in the seepage water.

2. Monitor the embankment and dam crest for evidence of slope instability, such as cracking or slumping of the embankment, or settlement of the crest.

3. Maintain the spillway and fish control fence free of debris that could obstruct the spillway during flood flows.

4. Evaluate the feasibility of a practical warning system to alert downstream residents in the event unsafe conditions develop at this facility.

All remedial measures, inspections and maintenance should be performed by or under the guidance of an engineer experienced in the design, construction and maintenance of earth dams.

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Department of the Army, Office of the Chief of Engineers, 1977, EC 1110-2-188, Engineering and Design National Program of Inspection of Non-Federal Dams.

Department of the Army, Office of the Chief of Engineers, 1979, ER 1110-2-106, Engineering and Design National Program of Inspection of Non-Federal Dams.

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McCracken, M. H., 1971, Structural Features Map of Missouri: Missouri Geological Survey, scale 1:500,000.

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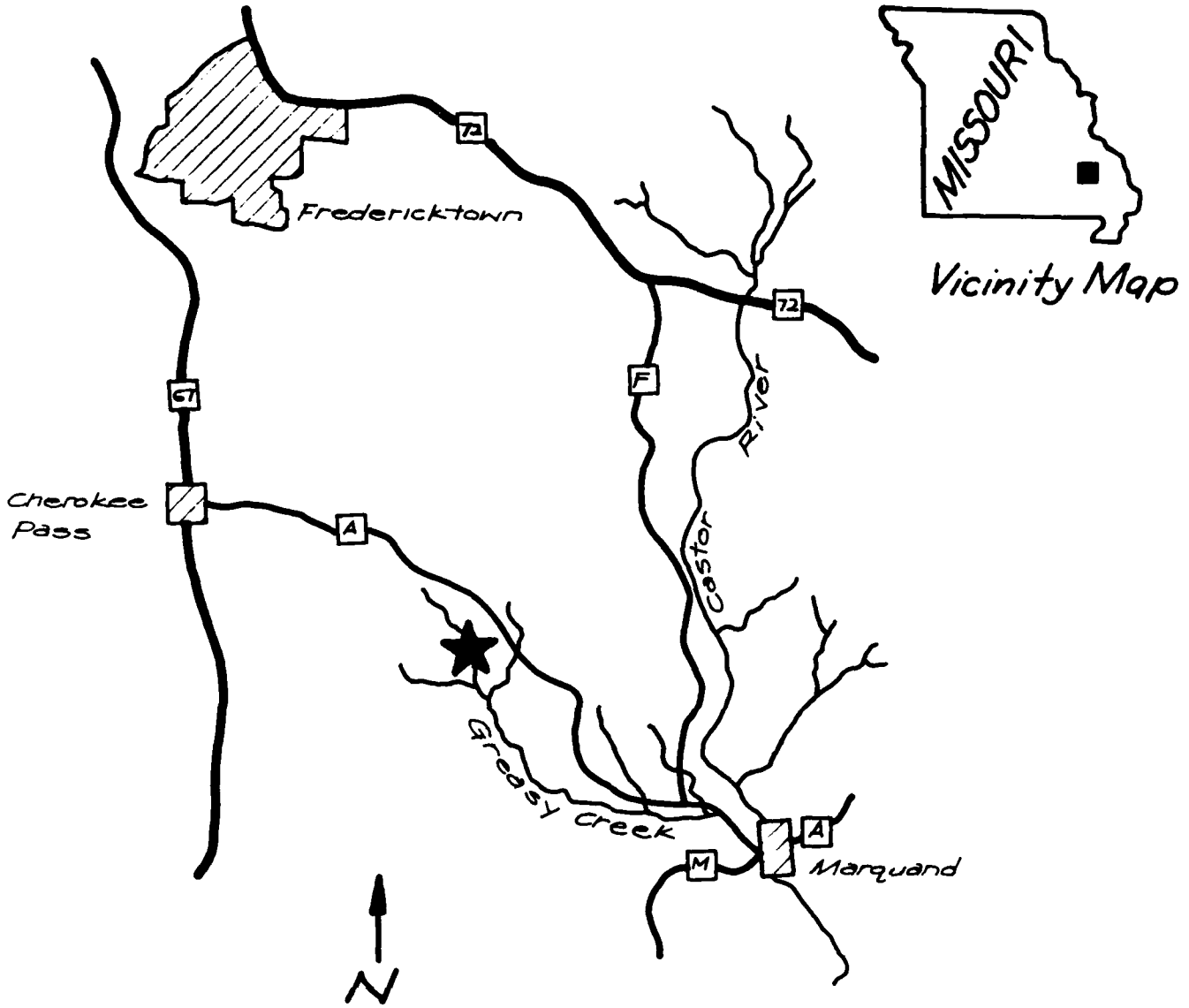
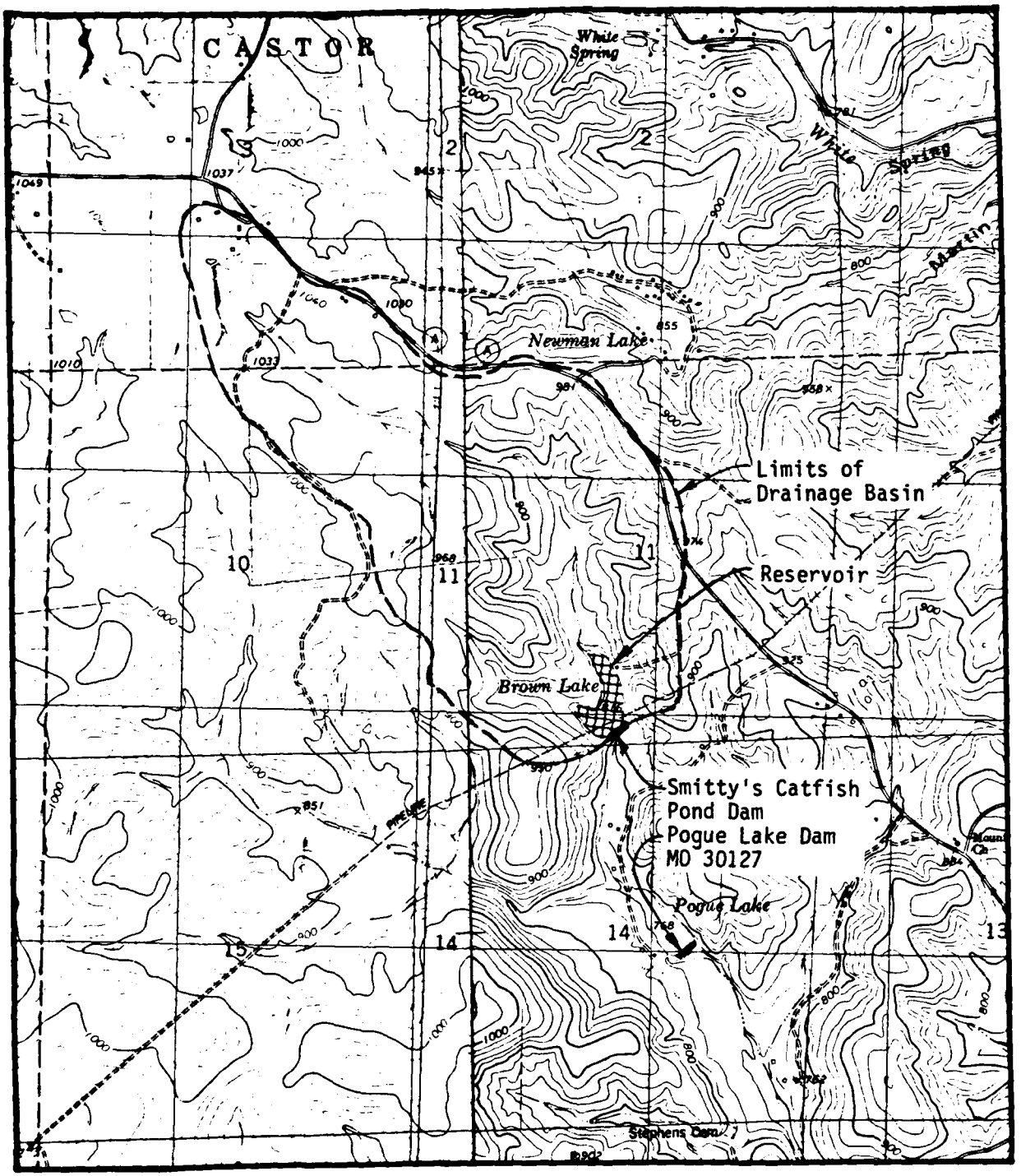


SITE LOCATION MAP	
SMITTY'S CATFISH POND DAM	
MO 30613	Fig. 1

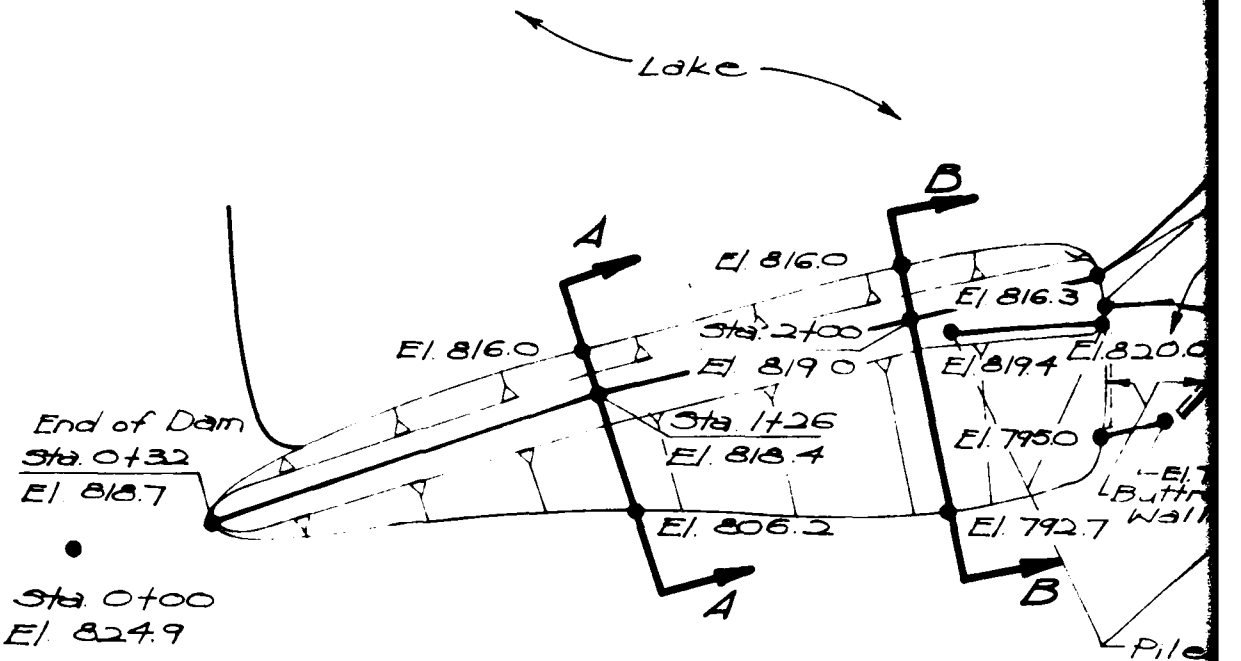


Note
Topography from USGS Marquand (1980) and Cherokee Pass (1980) 7.5-minute quadrangle maps.

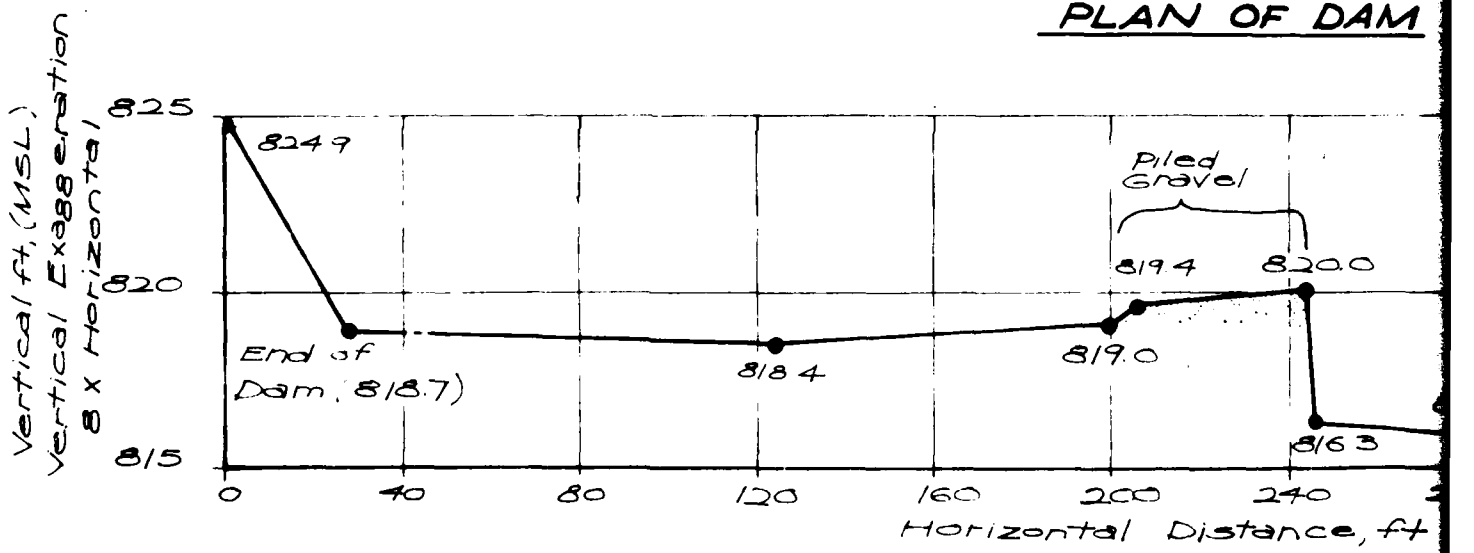
DRAINAGE BASIN AND SITE TOPOGRAPHY

SMITTY'S CATFISH POND DAM

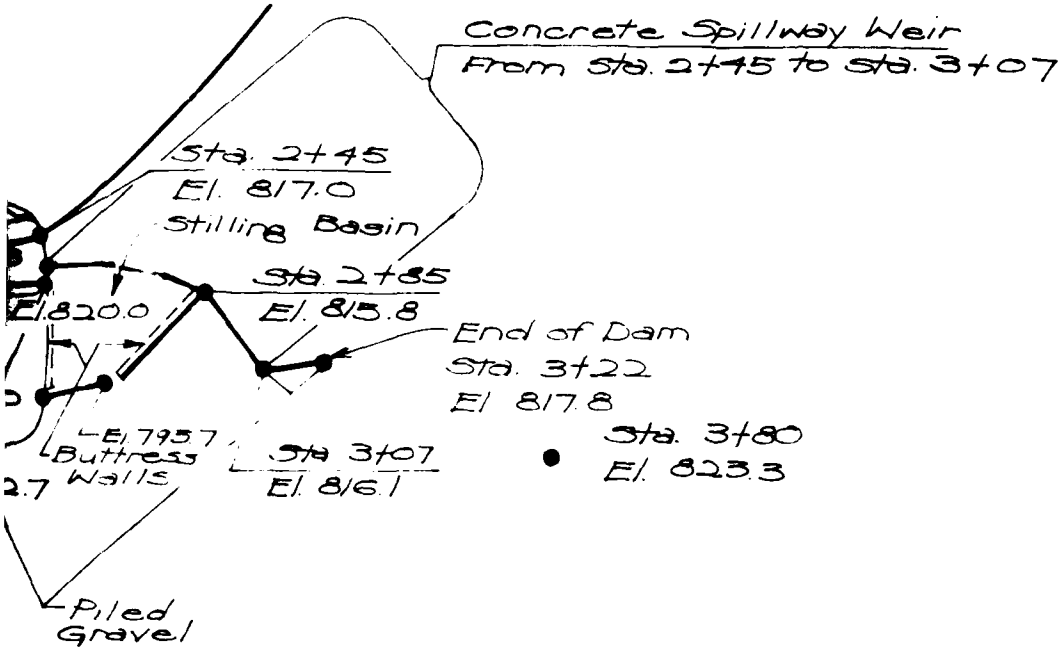
MO 30613 | Fig. 2



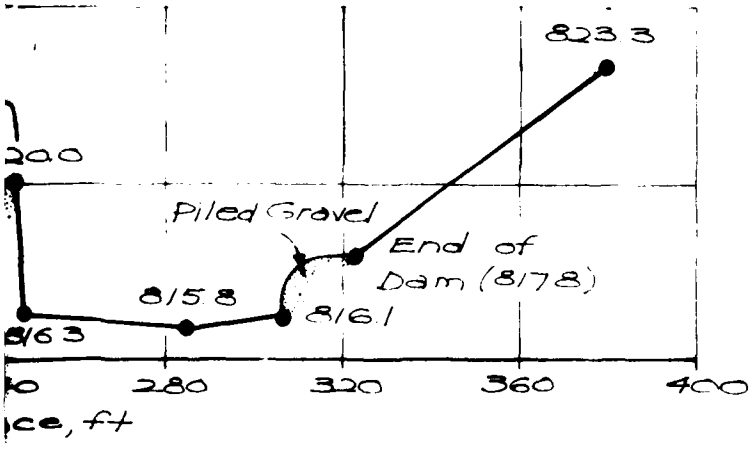
PLAN OF DAM



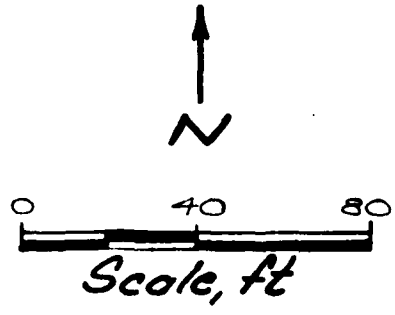
PROFILE OF DAM



DAM

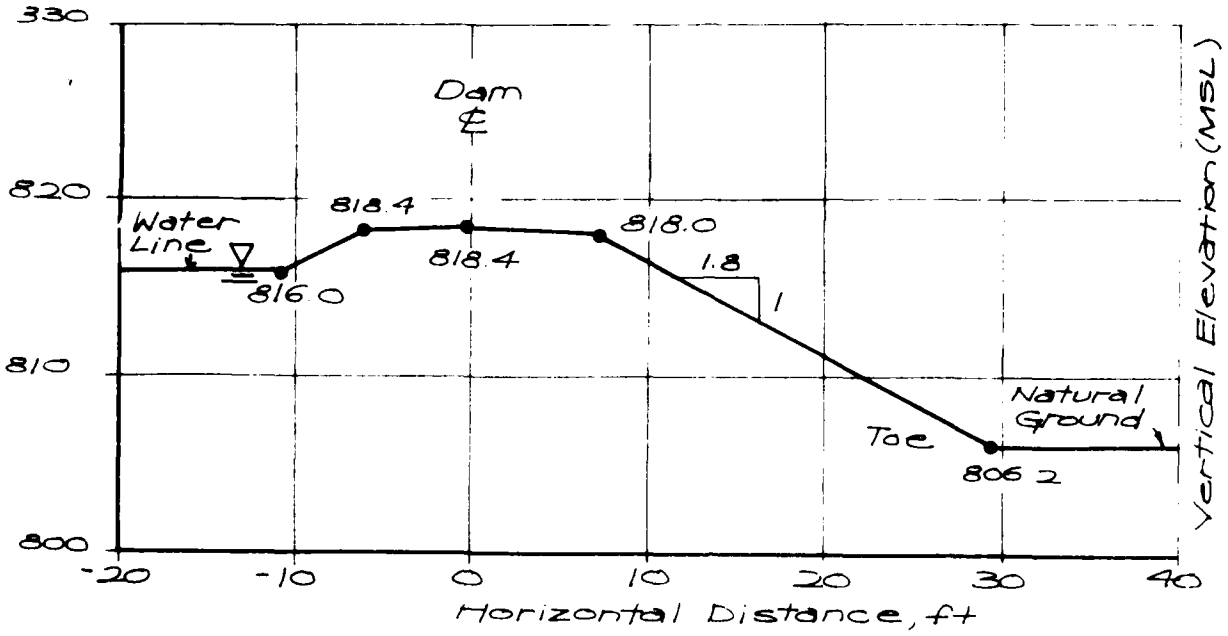


AM



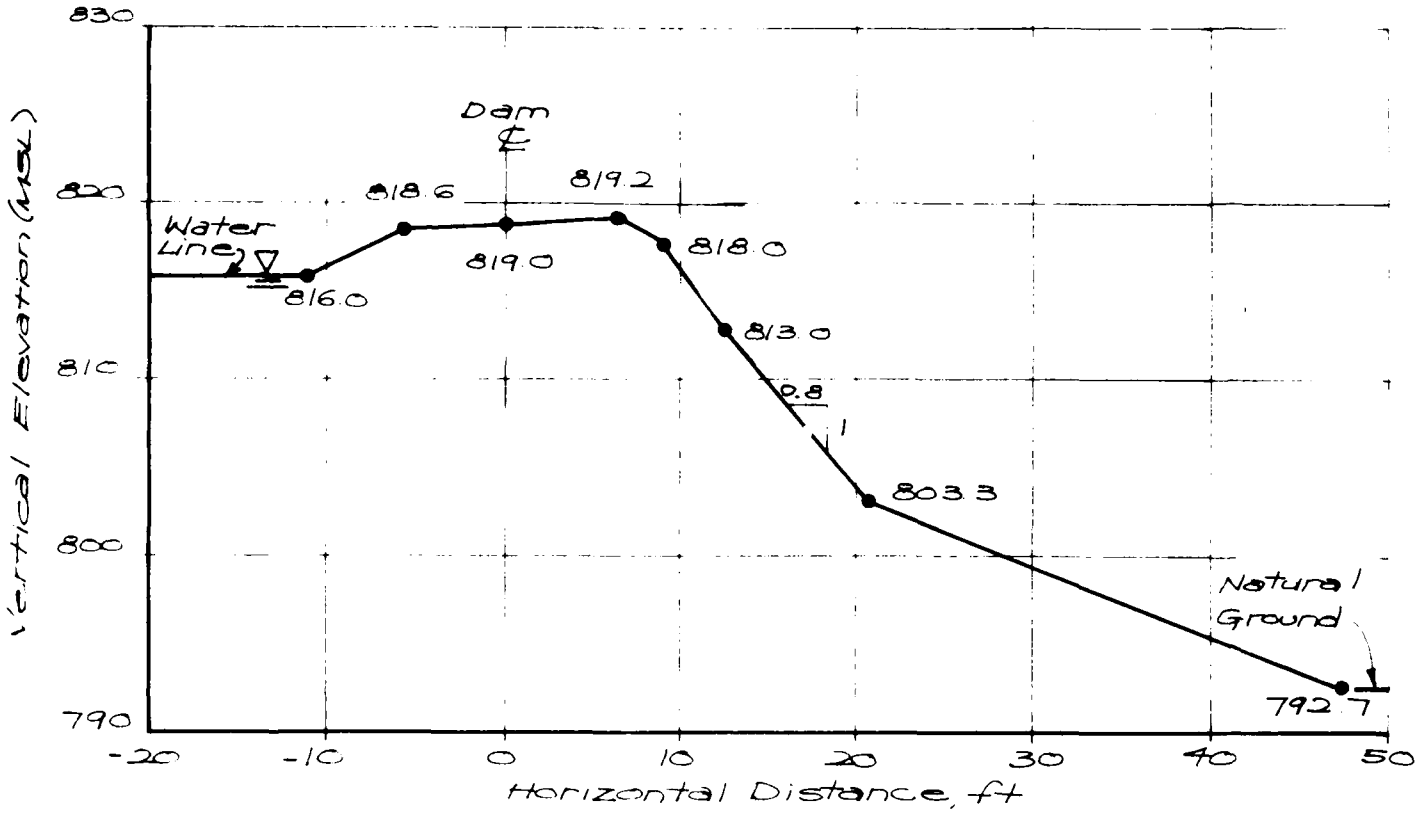
Note:
Surveyed 10 Mar. '81 by
James F. McCaul, III and
Assoc. Consulting
Engineers/Land Surveyors
Potosi, Mo. 63664

DAM AND SPILLWAY PLAN AND PROFILE	
SMITTY'S CATFISH POND DAM	
MO 30613	Fig. 3-A



SECTION A-A

Dam Section

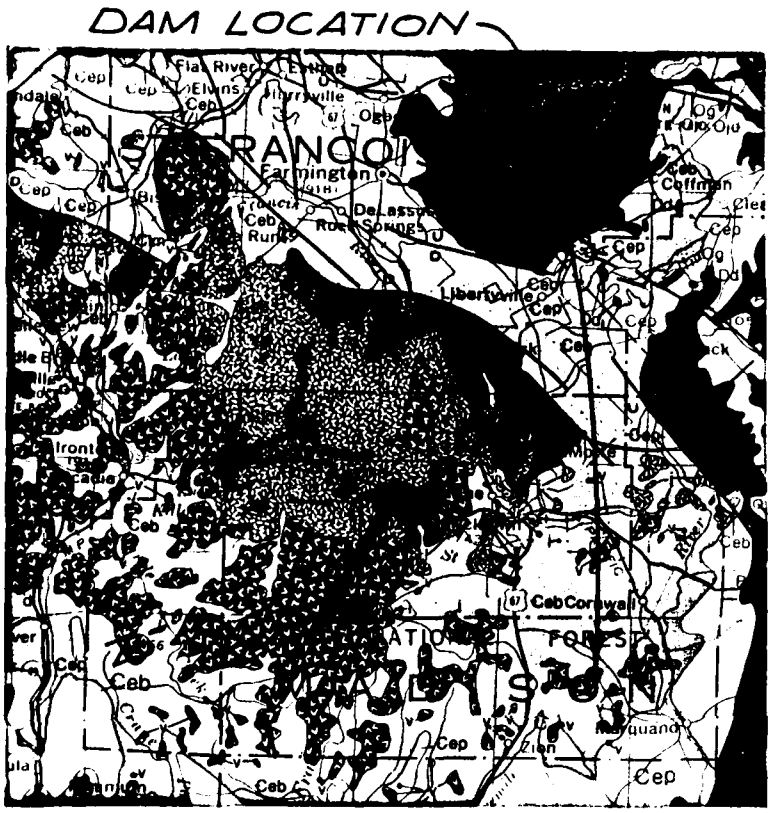


SECTION B-B

Maximum Dam Section

Note:
Surveyed 10 Mar '81 by
James F McCaul, III and
Assoc. Consulting
Engineers/Land Surveyors
Potosi, MO. 63664

DAM SECTIONS	
SMITTY'S CATFISH POND DAM	
MO 30613	Fig. 3-B



Legend

- Or — Roubidoux Formation
- Gasconade Dolomite
  - Gunter Sandstone Member
- Cep — Eminence Dolomite
- Potosi Dolomite
- Ceb — Derby-Doerun Dolomite
- Davis Formation
- Bonneterre Formation
  - Whetstone Creek Member
  - Sullivan Siltstone Member
- Reagan Sandstone (subsurface, western Missouri)
- Lamotte Sandstone
- Diabase (dikes and sills)
- St. Francois Mountains Intrusive Suite
- St. Francois Mountains Volcanic Supergroup

N

0 10 20

Scale, mile

REGIONAL GEOLOGIC MAP

SMITTY'S CATFISH POND DAM

MO 30613 | Fig. 4

APPENDIX A

Photographs

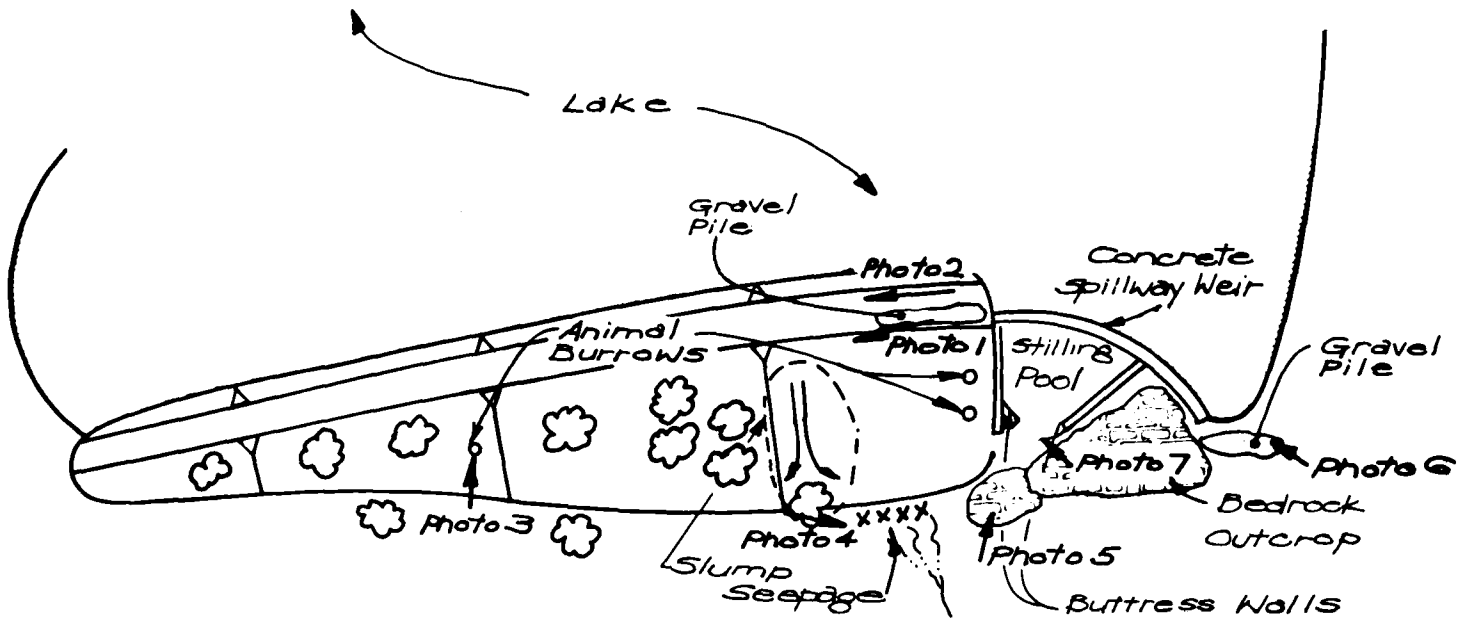


Photo 8
Aerial Photo of Downstream Hazard Zone

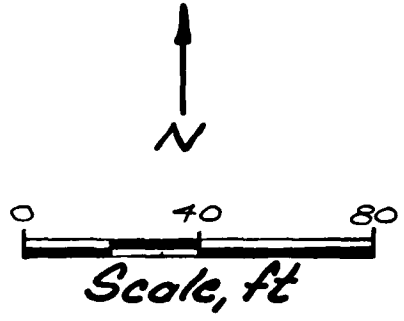


PHOTO LOCATION SKETCH	
SMITTY'S CATFISH POND DAM	
MO 30613	Fig. A-1

1. Downstream slope of dam showing vegetation cover. Looking west from right end of spillway. Reservoir is out of picture to the right.

2. View along dam crest. Looking west from vicinity of right end of spillway.

3. 8-in. diameter animal burrow, right of clipboard, on downstream slope of dam, near Sta 1+25 on Fig. 3A.

4. Seepage at toe of dam near maximum section. Seepage estimated at approximately 1 to 2 gal/min.

5. Spillway at left abutment. Note buttress walls at center of spillway and adjacent to main embankment, left side of photo. Also note felsite bedrock exposed at toe of dam, in discharge channel, and on abutment. Looking north from downstream channel.

6. Spillway viewed from left abutment, looking west. Note gravel piles on both sides of spillway and fish control fence upstream of spillway.

7. Concrete block wing wall/buttress wall at junction of spillway with main embankment. Looking west from left abutment. This portion of the spillway facility appears more recent than the remainder of the structure.

8. Part of downstream damage zone. Smitty's Catfish Pond Dam (MO 30613) and reservoir in the distance, upstream end of Pogue Lake in right foreground. Looking north.

APPENDIX B

Hydraulic/Hydrologic Data and Analyses

APPENDIX B
Hydraulic/Hydrologic Data and Analyses

B.1 Procedures

a. General. The hydraulic/hydrologic analyses were performed using the "HEC-1, Dam Safety Version (1 Apr 80)" computer program. The inflow hydrographs were developed for various precipitation events by applying them to a synthetic unit hydrograph. The inflow hydrographs were subsequently routed through the reservoir and appurtenant structures by the modified Puls reservoir routing option.

b. Precipitation events. The Probable Maximum Precipitation (PMP) and the 1 and 10 percent probability-of-occurrence events were used in the analyses. The total rainfall and corresponding distributions for the 1 and 10 percent probability events were provided by the St. Louis District, Corps of Engineers. The Probable Maximum Precipitation was determined from regional curves prepared by the US Weather Bureau (Hydrometeorological Report Number 33, 1956). The PMP distribution was computed by the HEC-1 program using the standard EM-1110-1411 method.

c. Unit hydrograph. The Soil Conservation Services (SCS) Dimensionless Unit Hydrograph method (SCS, 1971, Hydrology: National Engineering Handbook, Section 4) was used in the analysis. This method was selected because of its simplicity, applicability to drainage areas less than 10 mi^2, and its easy availability within the HEC-1 computer program.

The watershed lag time was computed using the SCS "curve number method" by an empirical relationship as follows:

$$L = \frac{\ell^{0.8}\,(s+1)^{0.7}}{1900\,Y^{0.5}} \qquad \text{(Equation 15-4)}$$

where: L = lag in hours
ℓ = hydraulic length of the watershed in feet = 9100
$s = \frac{1000}{CN} - 10 = 4.09$
CN = AMC II hydrologic soil curve number as indicated in Section B.2e.
Y = average watershed land slope in percent = 2.5.

This empirical relationship accounts for the soil cover, average watershed slope and hydraulic length.

With the lag time thus computed, another empirical relationship is used to compute the time of concentration as follows:

$$T_c = \frac{L}{0.6} \qquad \text{(Equation 15-3)}$$

where: T_c = time of concentration in hours

L = lag in hours.

Subsequent to the computation of the time of concentration, the unit hydrograph duration was approximated utilizing the following relationship:

$$\Delta D = 0.133 T_c \qquad \text{(Equation 16-12)}$$

where: ΔD = duration of unit excess rainfall
T_c = time of concentration in hours.

The final duration was selected to provide at least three discharge ordinates prior to the peak discharge ordinate of the unit hydrograph. For this dam, a unit hydrograph duration of 15 minutes was used.

d. Infiltration losses. The infiltration losses were computed by the HEC-1 computer program internally using the SCS loss function. The curve number of SCS loss rate procedure was established taking into consideration the variables of: (a) antecedent moisture condition, (b) hydrologic soil group classification, (c) vegetative cover and (d) present land usage in the watershed. In addition, the computed basin loss was reduced proportional to the impervious area in the drainage basin.

Antecedent moisture condition III (AMC III) was used for the PMF events and AMC II was used for the 1 and 10 percent probability events, in accordance with the guidelines. The remaining variables are defined in the SCS procedure and judgements in their selection were made on the basis of visual field inspection.

e. Starting elevations. Reservoir starting water surface elevations for this dam were set as follows:

(1) 1 and 10 percent probability events - spillway crest elevation of 815.8 ft.

(2) Probable Maximum Storm - spillway crest elevation of 815.8 ft.

f. Spillway Rating Curve. The HEC-2 computer program was used to compute the spillway rating curve. Critical depth was assumed at the spillway cross section due to the free falling spillway configuration.

B.2 Pertinent Data

a. Drainage area. 0.95 mi^2.

b. Storm duration. A unit hydrograph was developed by the SCS method option of HEC-1 program. The design storm of 48 hours duration was divided into 15-minute intervals in order to develop the inflow hydrograph.

c. Lag time. 1.53 hr

d. Hydrologic soil group. C

e. SCS curve numbers.

1. For PMF- AMC III - Curve Number 86
2. For 1 and 10 percent probability-of-occurrence events - AMC II - Curve Number 71

f. Storage. Elevation-area data were developed by planimetering areas at various elevation contours on the USGS Marquand, Missouri (1980) 7.5-minute quadrangle map. The data were entered on the $A and $E cards so that the HEC-1 program could compute storage volumes.

g. Outflow over dam crest. As the profile of the dam crest is irregular, flow over the crest was computed according to the "Flow Over Non-Level Dam Crest" supplement to the HEC-1 User's Manual. The crest length-elevation data and hydraulic constants were entered on the $D, $L, and $V cards.

h. Outflow capacity. The spillway rating curve was developed from the cross section data of the spillway using the HEC-2 program assuming critical depth at the spillway. The results of the above were entered on the Y4 and Y5 cards of the HEC-1 program.

i. Reservoir elevations. For the 50 and 100 percent of the PMF events, the starting reservoir elevation was 815.8 ft, the spillway crest elevation. For the 1 and 10 percent probability-of-occurrence events, the starting reservoir elevation was also 815.8 ft, the spillway crest elevation. The spillway was judged capable of passing antecedent storm runoff in 4 days, as per the guidelines.

B.3 Results

The results of the analyses as well as the input values to the HEC-1 program follow in this Appendix. Only the results summaries are included, not the intermediate output. Complete copies of the HEC-1 output are available in the project files.

```
**********
HMMM HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
LAST MODIFICATION  01 APR 80
**********
    1            A1     SMITTYS CATFISH POND, NO. 30613, MADISON COUNTY, MISSOURI.
    2            A2     WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
    3            A3     PROBABLE MAXIMUM FLOODS.
    4            B   192     0     15     0     0     0     0     0     0     0
    5            B1   5
    6            J    1     2     1
    7            J1  .50   1.00
    8            K    0  INFLOW                                  1
    9            K1     SMITTYS CATFISH POND INFLOW COMPUTATIONS, PMF.
   10            M    1     2   0.99                          1.0
   11            P    0    26   102   120   130   140
   12            T                                        -1   -86          0.02
   13            M2        1.93
   14            X   -1   -.05    5
   15            K    1    DAM                             1
   16            K1     FLOOD ROUTING AND OVERTOPPING ANALYSES
   17            V                                  1     1
   18            V1   1                                    -815.8    -1
   19            V4 815.8  816.2  816.4  816.7  816.8  817.3  817.7  818.6  819.9  822.7
   20            V4 824.8   826.   828.6
   21            V5   0.    20.    40.   100.   150.   300.   500.  1000.  2000.  5000.
   22            V5 8000.  10000.  15000.
   23            SA   0.   2.2    10.    15.    23.
   24            SE  800.   810.   816.   820.   830.
   25            SS 815.8
   26            SD 818.4   2.7   1.9
   27            SL   0.   130.   170.   220.   225.   239.
   28            SV 818.4  818.7  819.   820.   821.   823.
   29            K   99
```

Input Data
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
B4

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
 LAST MODIFICATION  01 APR 80
**********

RUN  DATE= 81/03/20.
     TIME= 08.29.22.

SMITTYS CATFISH POND, NO. 30613, MADISON COUNTY, MISSOURI.
WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
PROBABLE MAXIMUM FLOODS.

                                JOB SPECIFICATION
      NO     NMR    NMIN    IDAY    IHR    IMIN   METRC    IPLT    IPRT   NSTAN
     192       0      15       0      0       0       0       0       0       0
                          JOPER     NWT   LROPT   TRACE
                              5       0       0       0

                    MULTI-PLAN ANALYSES TO BE PERFORMED
                     NPLAN= 1  NRTIO= 2  LRTIO= 1
                RTIOS=    .50   1.00

**********      **********      **********      **********      **********

                          SUB-AREA RUNOFF COMPUTATION

SMITTYS CATFISH POND INFLOW COMPUTATIONS, PMF.

                ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT   INAME  ISTAGE  IAUTO
               INFLOW       0       0       0      0       0       1       0      0

                              HYDROGRAPH DATA
     IHYDG    IUNG     TAREA     SNAP     TRSDA     TRSPC     RATIO    ISNOW    ISAME    LOCAL
         1       2       .95     0.00       .95      1.00     0.000        0        0        0

                                PRECIP DATA
      SPFE      PMS       R6      R12      R24      R48      R72      R96
      0.00    26.00   102.00   120.00   130.00   140.00     0.00     0.00

                                LOSS DATA
     LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
         0    0.00    0.00    1.00    0.00    0.00    1.00   -1.00  -86.00    0.00     .02

     CURVE NO =  -86.00  WETNESS =   -1.00  EFFECT CN =   86.00

                              UNIT HYDROGRAPH DATA
                         TC=  0.00    LAG=  1.93

                              RECESSION DATA
                    STRTQ=   -1.00    QRCSN=    -.05    RTIOR= 5.00

 UNIT HYDROGRAPH 33 END OF PERIOD ORDINATES, TC=    0.00 HOURS, LAG=    1.93  VOL= 1.00
    18.     53.    109.    185.    244.    274.    275.    256.    225.    185.
   138.    104.     83.     66.     52.     40.     31.     29.     19.     15.
```

Output Summary
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
B5

	12.	9.	7.	6.	4.	3.	3.	2.	2.	1.
	1.	0.	0.							

END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.15	1	.00	.00	.00	1.	1.02	.15	97	.04	.04	.01	21.
1.01	.30	2	.00	.00	.00	1.	1.02	.30	98	.04	.04	.01	19.
1.01	.45	3	.00	.00	.00	1.	1.02	.45	99	.04	.04	.01	18.
1.01	1.00	4	.00	.00	.00	1.	1.02	1.00	100	.04	.04	.01	22.
1.01	1.15	5	.00	.00	.00	0.	1.02	1.15	101	.04	.04	.01	30.
1.01	1.30	6	.00	.00	.00	0.	1.02	1.30	102	.04	.04	.01	39.
1.01	1.45	7	.00	.00	.00	0.	1.02	1.45	103	.04	.04	.01	47.
1.01	2.00	8	.00	.00	.00	0.	1.02	2.00	104	.04	.04	.01	56.
1.01	2.15	9	.00	.00	.00	0.	1.02	2.15	105	.04	.04	.01	63.
1.01	2.30	10	.00	.00	.00	0.	1.02	2.30	106	.04	.04	.01	69.
1.01	2.45	11	.00	.00	.00	0.	1.02	2.45	107	.04	.04	.01	74.
1.01	3.00	12	.00	.00	.00	0.	1.02	3.00	108	.04	.04	.01	78.
1.01	3.15	13	.00	.00	.00	0.	1.02	3.15	109	.04	.04	.01	81.
1.01	3.30	14	.00	.00	.00	0.	1.02	3.30	110	.04	.04	.01	83.
1.01	3.45	15	.00	.00	.00	0.	1.02	3.45	111	.04	.04	.01	85.
1.01	4.00	16	.00	.00	.00	0.	1.02	4.00	112	.04	.04	.01	86.
1.01	4.15	17	.00	.00	.00	0.	1.02	4.15	113	.04	.04	.01	88.
1.01	4.30	18	.00	.00	.00	0.	1.02	4.30	114	.04	.04	.01	89.
1.01	4.45	19	.00	.00	.00	0.	1.02	4.45	115	.04	.04	.01	90.
1.01	5.00	20	.00	.00	.00	0.	1.02	5.00	116	.04	.04	.00	90.
1.01	5.15	21	.00	.00	.00	0.	1.02	5.15	117	.04	.04	.00	91.
1.01	5.30	22	.00	.00	.00	0.	1.02	5.30	118	.04	.04	.00	92.
1.01	5.45	23	.00	.00	.00	0.	1.02	5.45	119	.04	.04	.00	92.
1.01	6.00	24	.00	.00	.00	0.	1.02	6.00	120	.04	.04	.00	93.
1.01	6.15	25	.02	.00	.01	0.	1.02	6.15	121	.20	.19	.02	95.
1.01	6.30	26	.02	.00	.01	0.	1.02	6.30	122	.20	.18	.02	103.
1.01	6.45	27	.02	.00	.01	0.	1.02	6.45	123	.20	.18	.02	110.
1.01	7.00	28	.02	.00	.01	0.	1.02	7.00	124	.20	.18	.02	144.
1.01	7.15	29	.02	.00	.01	0.	1.02	7.15	125	.20	.18	.01	178.
1.01	7.30	30	.02	.00	.01	0.	1.02	7.30	126	.20	.18	.01	210.
1.01	7.45	31	.02	.00	.01	0.	1.02	7.45	127	.20	.18	.01	239.
1.01	8.00	32	.02	.00	.01	0.	1.02	8.00	128	.20	.18	.01	292.
1.01	8.15	33	.02	.00	.01	1.	1.02	8.15	129	.20	.18	.01	324.
1.01	8.30	34	.02	.00	.01	1.	1.02	8.30	130	.20	.18	.01	351.
1.01	8.45	35	.02	.00	.01	1.	1.02	8.45	131	.20	.18	.01	372.
1.01	9.00	36	.02	.00	.01	1.	1.02	9.00	132	.20	.19	.01	388.
1.01	9.15	37	.02	.00	.01	1.	1.02	9.15	133	.20	.19	.01	402.
1.01	9.30	38	.02	.00	.01	1.	1.02	9.30	134	.20	.19	.01	412.
1.01	9.45	39	.02	.00	.01	1.	1.02	9.45	135	.20	.19	.01	421.
1.01	10.00	40	.02	.00	.01	1.	1.02	10.00	136	.20	.19	.01	428.
1.01	10.15	41	.02	.00	.01	1.	1.02	10.15	137	.20	.19	.01	434.
1.01	10.30	42	.02	.00	.01	1.	1.02	10.30	138	.20	.19	.01	439.
1.01	10.45	43	.02	.00	.01	1.	1.02	10.45	139	.20	.19	.01	443.
1.01	11.00	44	.02	.00	.01	1.	1.02	11.00	140	.20	.19	.01	447.
1.01	11.15	45	.02	.00	.01	1.	1.02	11.15	141	.20	.19	.01	449.
1.01	11.30	46	.02	.00	.01	1.	1.02	11.30	142	.20	.19	.01	452.
1.01	11.45	47	.02	.00	.01	1.	1.02	11.45	143	.20	.19	.01	454.
1.01	12.00	48	.02	.00	.01	2.	1.02	12.00	144	.20	.19	.01	456.
1.01	12.15	49	.05	.01	.04	2.	1.02	12.15	145	.66	.65	.02	460.
1.01	12.30	50	.05	.01	.04	3.	1.02	12.30	146	.66	.65	.02	491.
1.01	12.45	51	.05	.01	.04	4.	1.02	12.45	147	.66	.65	.01	542.
1.01	13.00	52	.05	.02	.04	6.	1.02	13.00	148	.66	.65	.01	620.
1.01	13.15	53	.06	.02	.04	9.	1.02	13.15	149	.80	.79	.01	743.
1.01	13.30	54	.06	.02	.04	13.	1.02	13.30	150	.80	.78	.01	877.

Output Summary
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
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1.01	13.45	55	.06	.03	.04	17.	1.02	13.45	151	.80	.79	.01	1619.
1.01	14.00	56	.06	.03	.03	22.	1.02	14.00	152	.80	.79	.01	1162.
1.01	14.15	57	.08	.04	.04	28.	1.02	14.15	153	.99	.98	.01	1303.
1.01	14.30	58	.08	.04	.04	34.	1.02	14.30	154	.99	.99	.01	1496.
1.01	14.45	59	.08	.04	.04	41.	1.02	14.45	155	.99	.99	.01	1560.
1.01	15.00	60	.08	.04	.03	48.	1.02	15.00	156	.99	.99	.01	1680.
1.01	15.15	61	.08	.05	.03	56.	1.02	15.15	157	1.01	1.00	.01	1799.
1.01	15.30	62	.16	.10	.06	64.	1.02	15.30	158	2.02	2.00	.01	1928.
1.01	15.45	63	.43	.30	.13	79.	1.02	15.45	159	5.64	5.62	.02	2248.
1.01	16.00	64	.11	.08	.03	98.	1.02	16.00	160	1.41	1.41	.00	2461.
1.01	16.15	65	.07	.05	.02	125.	1.02	16.15	161	.93	.93	.00	2883.
1.01	16.30	66	.07	.06	.02	155.	1.02	16.30	162	.93	.93	.00	3371.
1.01	16.45	67	.07	.06	.02	180.	1.02	16.45	163	.93	.93	.00	3749.
1.01	17.00	68	.07	.06	.01	196.	1.02	17.00	164	.93	.93	.00	3934.
1.01	17.15	69	.06	.04	.01	201.	1.02	17.15	165	.73	.73	.00	3979.
1.01	17.30	70	.06	.05	.01	199.	1.02	17.30	166	.73	.73	.00	3911.
1.01	17.45	71	.06	.05	.01	192.	1.02	17.45	167	.73	.73	.00	3798.
1.01	18.00	72	.06	.05	.01	180.	1.02	18.00	168	.73	.73	.00	3369.
1.01	18.15	73	.01	.00	.00	165.	1.02	18.15	169	.07	.06	.00	2978.
1.01	18.30	74	.01	.00	.00	151.	1.02	18.30	170	.07	.06	.00	2693.
1.01	18.45	75	.01	.00	.00	138.	1.02	18.45	171	.07	.06	.00	2425.
1.01	19.00	76	.01	.00	.00	124.	1.02	19.00	172	.07	.06	.00	2148.
1.01	19.15	77	.01	.00	.00	108.	1.02	19.15	173	.07	.06	.00	1858.
1.01	19.30	78	.01	.00	.00	92.	1.02	19.30	174	.07	.06	.00	1566.
1.01	19.45	79	.01	.00	.00	77.	1.02	19.45	175	.07	.06	.00	1304.
1.01	20.00	80	.01	.00	.00	63.	1.02	20.00	176	.07	.06	.00	1073.
1.01	20.15	81	.01	.00	.00	52.	1.02	20.15	177	.07	.06	.00	873.
1.01	20.30	82	.01	.00	.00	42.	1.02	20.30	178	.07	.06	.00	711.
1.01	20.45	83	.01	.00	.00	35.	1.02	20.45	179	.07	.06	.00	590.
1.01	21.00	84	.01	.00	.00	30.	1.02	21.00	180	.07	.06	.00	497.
1.01	21.15	85	.01	.00	.00	26.	1.02	21.15	181	.07	.06	.00	429.
1.01	21.30	86	.01	.00	.00	22.	1.02	21.30	182	.07	.06	.00	369.
1.01	21.45	87	.01	.00	.00	19.	1.02	21.45	183	.07	.06	.00	319.
1.01	22.00	88	.01	.00	.00	17.	1.02	22.00	184	.07	.06	.00	284.
1.01	22.15	89	.01	.00	.00	16.	1.02	22.15	185	.07	.06	.00	257.
1.01	22.30	90	.01	.00	.00	15.	1.02	22.30	186	.07	.06	.00	235.
1.01	22.45	91	.01	.00	.00	14.	1.02	22.45	187	.07	.06	.00	216.
1.01	23.00	92	.01	.00	.00	13.	1.02	23.00	188	.07	.06	.00	204.
1.01	23.15	93	.01	.00	.00	12.	1.02	23.15	189	.07	.06	.00	193.
1.01	23.30	94	.01	.00	.00	12.	1.02	23.30	190	.07	.06	.00	184.
1.01	23.45	95	.01	.00	.00	11.	1.02	23.45	191	.07	.06	.00	176.
1.02	0.00	96	.01	.00	.00	11.	1.03	0.00	192	.07	.06	.00	171.
								SUM		36.40	34.55	1.85	83483.
										(925.11	878.11	47.11	2363.41)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3939.	2458.	835.	434.	83384.
CMS	112.	70.	24.	12.	2361.
INCHES		24.07	32.78	34.02	34.02
MM		611.34	830.62	864.12	864.12
AC-FT		1219.	1656.	1723.	1723.
THOUS CU-M		1503.	2043.	2125.	2125.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Output Summary
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
B7

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1	RATIO 2
				.50	1.00
HYDROGRAPH AT	INFLOW	.99	1	1970.	3939.
		(2.46)		(55.77)(111.55)(	
ROUTED TO	DAM	.99	1	1970.	3948.
		(2.46)		(55.78)(111.80)(	

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	815.80	815.80	818.40
	STORAGE	39.	39.	68.
	OUTFLOW	0.	0.	889.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	819.39	.99	82.	1970.	4.25	41.25	0.00
1.00	820.41	2.01	97.	3948.	6.50	41.25	0.00

Output Summary
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
B8

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .23	RATIO 2 .24	RATIO 3 .25
HYDROGRAPH AT	INFLOW	.95 (2.46)	1	906. (25.66)	945. (26.77)	985. (27.89)
ROUTED TO	DAM	.95 (2.46)	1	887. (25.11)	925. (26.20)	964. (27.30)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	815.90	815.80	818.40
STORAGE	39.	39.	68.
OUTFLOW	0.	0.	889.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.23	818.40	0.00	68.	887.	0.00	41.50	0.00
.24	818.46	.06	69.	925.	.75	41.50	0.00
.25	818.53	.13	70.	964.	1.29	41.50	0.00

Output Summary
Various PMF Events
Smitty's Catfish Pond Dam
MO 30613
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HMMM HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
LAST MODIFICATION  01 APR 80
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1  A1   SMITTYS CATFISH POND, NO. 30613, MADISON COUNTY, MISSOURI.
2  A2   WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-TE00.
3  A3   PROBABILISTIC FLOOD - 100 YEAR.
4  B    192    0    19    0    0    0    0    0    0    0
5  B1   3
6  K    0  INFLOW                                   1
7  K1 RAIN STA. 18=LESTERVILLE, FREQ=  1.0, INTERVAL=15.0 MIN., DURATION= 48 HRS.
8  K    0    2   0.99                    1.0
9  B    192   8.838                DA =   5.00
10 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
11 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
12 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
13 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
14 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
15 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
16 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
17 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
18 B1  .016   .016   .016   .016   .016   .016   .016   .016   .016   .016
19 B1  .016   .016   .016   .016   .016   .016   .021   .021   .021   .021
20 B1  .021   .021   .021   .021   .021   .021   .021   .021   .021   .021
21 B1  .021   .021   .021   .021   .021   .021   .021   .021   .021   .021
22 B1  .041   .041   .041   .041   .042   .042   .042   .042   .042   .042
23 B1  .042   .042   .042   .042   .042   .042   .042   .042   .042   .042
24 B1  .042   .041   .041   .041   .075   .076   .076   .076   .076   .076
25 B1  .102   .102   .178   .180   .424   .769  1.685   .431   .181   .179
26 B1  .102   .102   .076   .076   .076   .076   .076   .076   .021   .021
27 B1  .021   .021   .021   .021   .021   .021   .021   .021   .021   .021
28 B1  .021   .021   .021   .021   .021   .021   .021   .021   .021   .021
29 B1  .021   .021
30 T   ....   ...                                  -1    -71          0.02
31 M2         1.53
32 K   -1    -.09     9
33 K    1    DAM                                   1
34 K1      FLOOD ROUTING AND OVERTOPPING ANALYSES
35 Y                                 1
36 Y1     1                                      -815.8    -1
37 Y4 815.8   816.2   816.4   816.7   816.8   817.3   817.7   818.6   819.9   822.7
38 Y4 824.8   826.    826.6
39 Y5    0.    20.    40.    100.    150.    300.    500.   1000.   2000.   9000.
40 Y5 8000.  10000.  15000.
41 SA    0.   2.2    10.    15.    23.
42 SE  800.   810.   816.   820.   830.
43 S5 819.8
44 SD 818.4   2.7    1.5
45 SL    0.   130.   170.   220.   229.   235.
46 SV 818.4  818.7   819.   820.   821.   823.
47 K   99
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Input Data
1% Probability Event
Smitty's Catfish Pond Dam
MO 30613
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Output Summary
1% Probability Event
Smitty's Catfish Pond Dam
MO 30613

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  01 APR 80
**********************************

RUN  DATE* 81/03/20.
     TIME* 08.25.20.

                  SMITTYS CATFISH POND, NO. 30613, MADISON COUNTY, MISSOURI.
                  WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
                  PROBABILISTIC FLOOD - 100 YEAR.

                                    JOB SPECIFICATION
           NQ       NHR      NMIN     IDAY      IHR     IMIN    METRC      IPLT      IPRT     NSTAN
          192         0        15        0        0        0        0         0         0         0
                                     JOPER      NWT    LROPT    TRACE
                                         3        0        0        0

     *********          *********          *********          *********          *********

                                SUB-AREA RUNOFF COMPUTATION

          RAIN STA. IN=LESTERVILLE. FREQ=  1.0. INTERVAL=15.0 MIN.. DURATION= 48 HRS.

                       ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                       INFLOW       0        0        0        0        0        1        0        0

                                     HYDROGRAPH DATA
          IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
              0        2      .95     0.00      .95     1.00    0.000        0        0        0

                                       PRECIP DATA
                                   NP    STORM      DAJ      DAK
                                  192     8.84     0.00     0.00
                                      PRECIP PATTERN
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.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
.04	.04	.04	.04	.08	.08	.08	.08	.08	.08
.10	.10	.18	.18	.42	.77	1.69	.43	.18	.18
.10	.10	.08	.08	.08	.08	.08	.08	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02								

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-71.00	0.00	.02

CURVE NO = -71.00 WETNESS = -1.00 EFFECT CN = 71.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 1.53

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 5.00

UNIT HYDROGRAPH 33 END OF PERIOD ORDINATES. TC= 0.00 HOURS. LAG= 1.53 VOL= 1.00

18.	53.	109.	189.	244.	274.	275.	256.	225.	185.
138.	104.	83.	66.	52.	40.	31.	25.	19.	15.
12.	9.	7.	6.	4.	3.	3.	2.	2.	1.
1.	0.	0.							

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.15	1	.02	.00	.02	1.	1.02	.15	97	.02	.01	.01	10.
1.01	.30	2	.02	.00	.02	1.	1.02	.30	98	.02	.01	.01	10.
1.01	.45	3	.02	.00	.02	1.	1.02	.45	99	.02	.01	.01	11.
1.01	1.00	4	.02	.00	.02	1.	1.02	1.00	100	.02	.01	.01	11.
1.01	1.15	5	.02	.00	.02	1.	1.02	1.15	101	.02	.01	.01	12.
1.01	1.30	6	.02	.00	.02	1.	1.02	1.30	102	.02	.01	.01	12.
1.01	1.45	7	.02	.00	.02	1.	1.02	1.45	103	.02	.01	.01	13.
1.01	2.00	8	.02	.00	.02	1.	1.02	2.00	104	.02	.01	.01	13.
1.01	2.15	9	.02	.00	.02	1.	1.02	2.15	105	.02	.01	.01	14.
1.01	2.30	10	.02	.00	.02	1.	1.02	2.30	106	.02	.01	.01	14.
1.01	2.45	11	.02	.00	.02	1.	1.02	2.45	107	.02	.01	.01	15.
1.01	3.00	12	.02	.00	.02	1.	1.02	3.00	108	.02	.01	.01	15.
1.01	3.15	13	.02	.00	.02	1.	1.02	3.15	109	.02	.01	.01	16.
1.01	3.30	14	.02	.00	.02	1.	1.02	3.30	110	.02	.01	.01	16.
1.01	3.45	15	.02	.00	.02	1.	1.02	3.45	111	.02	.01	.01	17.
1.01	4.00	16	.02	.00	.02	1.	1.02	4.00	112	.02	.01	.01	17.
1.01	4.15	17	.02	.00	.02	1.	1.02	4.15	113	.02	.01	.01	17.
1.01	4.30	18	.02	.00	.02	1.	1.02	4.30	114	.02	.01	.01	18.
1.01	4.45	19	.02	.00	.02	1.	1.02	4.45	115	.02	.01	.01	18.
1.01	5.00	20	.02	.00	.02	1.	1.02	5.00	116	.02	.01	.01	18.
1.01	5.15	21	.02	.00	.02	1.	1.02	5.15	117	.02	.01	.01	19.
1.01	5.30	22	.02	.00	.02	1.	1.02	5.30	118	.02	.01	.01	19.
1.01	5.45	23	.02	.00	.02	1.	1.02	5.45	119	.02	.01	.01	19.
1.01	6.00	24	.02	.00	.02	1.	1.02	6.00	120	.02	.01	.01	19.
1.01	6.15	25	.02	.00	.02	1.	1.02	6.15	121	.04	.02	.02	20.
1.01	6.30	26	.02	.00	.02	1.	1.02	6.30	122	.04	.02	.02	20.
1.01	6.45	27	.02	.00	.02	1.	1.02	6.45	123	.04	.02	.02	22.
1.01	7.00	28	.02	.00	.02	1.	1.02	7.00	124	.04	.02	.02	23.
1.01	7.15	29	.02	.00	.02	1.	1.02	7.15	125	.04	.02	.02	23.
1.01	7.30	30	.02	.00	.02	1.	1.02	7.30	126	.04	.02	.02	24.
1.01	7.45	31	.02	.00	.02	1.	1.02	7.45	127	.04	.02	.02	31.
1.01	8.00	32	.02	.00	.02	1.	1.02	8.00	128	.04	.02	.02	34.
1.01	8.15	33	.02	.00	.02	1.	1.02	8.15	129	.04	.02	.02	37.
1.01	8.30	34	.02	.00	.02	1.	1.02	8.30	130	.04	.02	.02	39.
1.01	8.45	35	.02	.00	.02	1.	1.02	8.45	131	.04	.02	.02	41.
1.01	9.00	36	.02	.00	.02	1.	1.02	9.00	132	.04	.02	.02	43.
1.01	9.15	37	.02	.00	.02	1.	1.02	9.15	133	.04	.02	.02	44.
1.01	9.30	38	.02	.00	.02	1.	1.02	9.30	134	.04	.02	.02	46.

Output Summary
12 Probability Event
Smitty's Catfish Pond Dam
MO 30613
B12

Output Summary
12 Probability Event
Smitty's Catfish Pond Dam
MO 30613
B13

1.01	9.45	39	.02	.00	.02	1.	1.02	9.45	135	.04	.02	.02	47.
1.01	10.00	40	.02	.00	.02	1.	1.02	10.00	136	.04	.02	.02	48.
1.01	10.15	41	.02	.00	.02	1.	1.02	10.15	137	.04	.02	.02	49.
1.01	10.30	42	.02	.00	.02	1.	1.02	10.30	138	.04	.02	.02	90.
1.01	10.45	43	.02	.00	.02	1.	1.02	10.45	139	.04	.02	.02	91.
1.01	11.00	44	.02	.00	.02	1.	1.02	11.00	140	.04	.02	.02	92.
1.01	11.15	45	.02	.00	.02	1.	1.02	11.15	141	.04	.02	.02	93.
1.01	11.30	46	.02	.00	.02	1.	1.02	11.30	142	.04	.02	.02	93.
1.01	11.45	47	.02	.00	.02	1.	1.02	11.45	143	.04	.02	.02	94.
1.01	12.00	48	.02	.00	.02	1.	1.02	12.00	144	.04	.02	.02	95.
1.01	12.15	49	.02	.00	.02	1.	1.02	12.15	145	.07	.04	.03	96.
1.01	12.30	50	.02	.00	.02	1.	1.02	12.30	146	.08	.05	.03	97.
1.01	12.45	51	.02	.00	.02	1.	1.02	12.45	147	.08	.05	.03	98.
1.01	13.00	52	.02	.00	.02	1.	1.02	13.00	148	.08	.05	.03	84.
1.01	13.15	53	.02	.00	.02	1.	1.02	13.15	149	.08	.05	.03	98.
1.01	13.30	54	.02	.00	.02	1.	1.02	13.30	150	.08	.05	.03	77.
1.01	13.45	55	.02	.00	.02	1.	1.02	13.45	151	.10	.07	.04	83.
1.01	14.00	56	.02	.00	.02	1.	1.02	14.00	152	.10	.07	.03	91.
1.01	14.15	57	.02	.00	.01	1.	1.02	14.15	153	.18	.12	.06	99.
1.01	14.30	58	.02	.00	.01	1.	1.02	14.30	154	.18	.12	.06	110.
1.01	14.45	59	.02	.00	.01	1.	1.02	14.45	155	.42	.30	.12	128.
1.01	15.00	60	.02	.00	.01	1.	1.02	15.00	156	.76	.57	.19	160.
1.01	15.15	61	.02	.00	.01	2.	1.02	15.15	157	1.67	1.36	.32	229.
1.01	15.30	62	.02	.00	.01	2.	1.02	15.30	158	.43	.36	.07	338.
1.01	15.45	63	.02	.00	.01	2.	1.02	15.45	159	.18	.15	.03	402.
1.01	16.00	64	.02	.00	.01	2.	1.02	16.00	160	.18	.15	.02	441.
1.01	16.15	65	.02	.00	.01	2.	1.02	16.15	161	.10	.09	.01	469.
1.01	16.30	66	.02	.00	.01	3.	1.02	16.30	162	.10	.09	.01	829.
1.01	16.45	67	.02	.00	.01	3.	1.02	16.45	163	.08	.07	.01	839.
1.01	17.00	68	.02	.00	.01	3.	1.02	17.00	164	.08	.07	.01	941.
1.01	17.15	69	.02	.00	.01	3.	1.02	17.15	165	.08	.07	.01	718.
1.01	17.30	70	.02	.00	.01	4.	1.02	17.30	166	.08	.07	.01	625.
1.01	17.45	71	.02	.00	.01	4.	1.02	17.45	167	.08	.07	.01	526.
1.01	18.00	72	.02	.00	.01	4.	1.02	18.00	168	.08	.07	.01	447.
1.01	18.15	73	.02	.00	.01	5.	1.02	18.15	169	.02	.02	.00	388.
1.01	18.30	74	.02	.00	.01	5.	1.02	18.30	170	.02	.02	.00	338.
1.01	18.45	75	.02	.00	.01	5.	1.02	18.45	171	.02	.02	.00	292.
1.01	19.00	76	.02	.00	.01	5.	1.02	19.00	172	.02	.02	.00	252.
1.01	19.15	77	.02	.00	.01	5.	1.02	19.15	173	.02	.02	.00	218.
1.01	19.30	78	.02	.00	.01	6.	1.02	19.30	174	.02	.02	.00	188.
1.01	19.45	79	.02	.00	.01	6.	1.02	19.45	175	.02	.02	.00	178.
1.01	20.00	80	.02	.00	.01	6.	1.02	20.00	176	.02	.02	.00	139.
1.01	20.15	81	.02	.00	.01	6.	1.02	20.15	177	.02	.02	.00	119.
1.01	20.30	82	.02	.00	.01	7.	1.02	20.30	178	.02	.02	.00	100.
1.01	20.45	83	.02	.00	.01	7.	1.02	20.45	179	.02	.02	.00	88.
1.01	21.00	84	.02	.00	.01	7.	1.02	21.00	180	.02	.02	.00	78.
1.01	21.15	85	.02	.00	.01	7.	1.02	21.15	181	.02	.02	.00	71.
1.01	21.30	86	.02	.00	.01	8.	1.02	21.30	182	.02	.02	.00	66.
1.01	21.45	87	.02	.00	.01	8.	1.02	21.45	183	.02	.02	.00	61.
1.01	22.00	88	.02	.00	.01	8.	1.02	22.00	184	.02	.02	.00	58.
1.01	22.15	89	.02	.00	.01	8.	1.02	22.15	185	.02	.02	.00	55.
1.01	22.30	90	.02	.00	.01	8.	1.02	22.30	186	.02	.02	.00	53.
1.01	22.45	91	.02	.00	.01	9.	1.02	22.45	187	.02	.02	.00	51.
1.01	23.00	92	.02	.00	.01	9.	1.02	23.00	188	.02	.02	.00	49.
1.01	23.15	93	.02	.00	.01	9.	1.02	23.15	189	.02	.02	.00	48.
1.01	23.30	94	.02	.00	.01	9.	1.02	23.30	190	.02	.02	.00	47.
1.01	23.45	95	.02	.00	.01	9.	1.02	23.45	191	.02	.02	.00	46.
1.02	0.00	96	.02	.00	.01	10.	1.03	0.00	192	.02	.02	.00	45.
....	....	.	...	..	.	..	.						
									SUM	8.84	5.39	3.45	12870.

Output Summary
1% Probability Event
Smitty's Catfish Pond Dam
MO 30613
B14

1 224.11 137.11 88.11 364.441

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	833.	404.	131.	67.	12037.
CMS	24.	11.	4.	2.	363.
INCHES		3.96	5.14	5.24	9.24
MM		100.47	130.44	133.03	133.03
AC-FT		200.	260.	265.	265.
THOUS CU M		247.	321.	327.	327.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

FLOOD ROUTING AND OVERTOPPING ANALYSES

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-816.	-1

STAGE	815.80	816.20	816.40	816.70	816.80	817.30	817.70	818.60	819.90	822.70
	824.80	826.00	828.60							
FLOW	0.00	20.00	40.00	100.00	150.00	300.00	500.00	1000.00	2000.00	5000.00
	8000.00	10000.00	15000.00							
SURFACE AREA=	0.	2.	10.	15.	23.					
CAPACITY=	0.	7.	41.	91.	279.					
ELEVATION=	800.	810.	816.	820.	830.					

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
815.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
818.4	2.7	1.5	0.

CREST LENGTH	0.	130.	170.	220.	229.	239.
AT OR BELOW ELEVATION	818.4	818.7	819.0	820.0	821.0	823.0

END-OF-PERIOD HYDROGRAPH ORDINATES

NO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.15	1	.25	1.	0.	39.	815.8
1.01	.30	2	.50	1.	0.	39.	815.8
1.01	.45	3	.75	1.	0.	39.	815.8
1.01	1.00	4	1.00	1.	0.	39.	815.8
1.01	1.15	5	1.25	1.	0.	39.	815.8

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	INFLOW	833.	404.	131.	67.	.99
	(	23.59)(	11.44)(	3.71)(	1.89)(	2.46)
ROUTED TO	DAM	809.	403.	128.	65.	.99
	(	22.79)(	11.40)(	3.64)(	1.84)(	2.46)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	815.80	815.80	818.40
STORAGE	39.	39.	68.
OUTFLOW	0.	0.	809.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	818.25	0.00	67.	805.	0.00	41.00	0.00

Output Summary
1% Probability Event
Smitty's Catfish Pond Dam
MO 30613
B15